



FRIDAY, APRIL 13.

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Contributions.

Accident Record—Correction.

JERSEY SHORE, Pa., March 31, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your paper for March 30, I notice that you report an accident on the Beech Creek Railroad at Hawk Run, Pa., where-in a locomotive exploded, killing a fireman. This is a mistake. The fireman is now at work and no one was seriously injured; neither was the engine seriously damaged.

A. G. PALMER, Superintendent.

The McElroy Heating System—Correction.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Mr. R. C. Blackall requests me to say to you that the figures as to the cost of fitting up a car with the McElroy system of heating, as given you by Mr. Corey, are not correct. The actual cost of fitting up a 56-ft. car is \$79.29. This includes a steam gauge and a three-way cock in cross-over, which we sometimes leave out. It also includes extra heavy pipe and fittings of all sizes used on car.

The bills for labor in putting apparatus on car and covering train pipe aggregate \$20.64. J. F. MC ELROY.

[Without consulting Mr. Corey it is pretty safe to say that he was not quoted correctly in the report, which was received late and very hurriedly prepared for the press.—EDITOR RAILROAD GAZETTE.]

The Preservation of Ties.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In recent issues of your paper attention has been drawn to "Our Vanishing Forests," "Life of Ties," and "Cross Ties," all of which I have carefully read and considered.

There can be no doubt, as every railroad man will readily admit, that the problem, how to provide the necessary number of ties required each year for our railroads in process of building and for renewals, is engrossing the earnest energies of many active and well informed minds. Eighty-four million of ties to be provided for every year is indeed a serious drain upon our forests, and they cannot stand it long. In your issue of March 3, you say, editorially: "The wooden tie is, when in its perfect condition, about the best thing for its purposes that could be contrived. It is elastic, distributes its load well over the roadbed, involves the least possible number of parts, and is convenient in construction work and in track repairs beyond anything else ever used. It seems probable, therefore, that the first great step taken by the roads generally towards providing for the future supply of ties will be in the preservative treatment of timber rather than in the adoption of metal ties."

With this statement I heartily concur, and in looking over your recent files I find a notice and a cut of what is known as the Servis railroad tie plate, of which I have some practical knowledge. This plate is made of steel, and is 8 in. in length and $3\frac{1}{2}$ in. wide, and $\frac{1}{16}$ of an inch thick, with flanges nearly an inch deep, and weighs two pounds. The plate is provided with flanges at its extreme sides, which are forced into the tie parallel with the grain of the wood, bringing the plate flush with the surface of the tie, and effectually preventing the tie being cut by the rail. Railroad men know that a soft wood tie, such as chestnut, red wood, or even Georgia pine, is rendered useless by the rail cutting into it at each end before the body of the tie is worn out in the ground. The cedar tie is found in abundance in Canada and elsewhere, and can be obtained comparatively cheap, and is proved to be the most lasting wood in the world, as far as climatic influences can affect it; but owing to the grinding and wear of the rail upon it when used as a railroad tie it lasts but from four to five years.

With a plate upon them they apparently can be made to last from twelve to fifteen years. I know whereof I speak. I have a cedar tie in a road for three years with the Servis plate upon it, with heavy traffic going over it day and night

all that time and the rails have not cut into it a particle, leaving the ends of this tie quite as good and free from wear as any part of the rest of it, and I believe that the tie will last its whole life time, which will not be much short of fifteen years, with the use of this simple device. I have all the elasticity of a wooden tie so much to be desired, with the durability of steel. The steel plate I can use again on another tie, and so on until it itself is in turn worn out.

I have been shown, on the Manhattan Elevated, at 106th street and Third avenue, these plates which have been laid down for more than two years upon Georgia pine, and although weighing only $1\frac{1}{2}$ lbs. to each plate, the wear of the rail upon the ties the whole of that time is imperceptible, while the ties put down at the same time without the plate are badly worn.

With these facts before me, it seems to me that our friend "Sound Sleeper" will find that American genius has already discovered and invented, if not a "tie," at least a protection for soft wood ties, whereby their life may be so extended that "our vanishing forests" can take a rest, and instead of 84 millions of ties being required each year to supply the railroad demand, a much less quantity will necessarily have to be cut.

"AMERICAN GENIUS."

[We allow "American Genius" to speak for the device which he likes so well, even at the risk of being trapped into giving it some free advertising, because the question of the tie plate is worth thinking about. At the same time he must know that the plate will be met with the objections that it is noisy and that the rail will move on it more readily than on the face of the wooden tie. In consequence of the last condition the strain on the spikes and abrasion of them, especially on curves, will be increased. Whether or not the advantages offered by the plate are sufficient to counterbalance these objections is a matter of discussion among those who have to do with maintenance of way. The attention of "American Genius" is called to a Dutch bearing plate shown in the *Railroad Gazette* of Sept. 30, 1887. That is designed with a channel in which the rail rests, and the outward strain is taken on a shoulder of the plate against which the base of the rail bears.—EDITOR RAILROAD GAZETTE.]

The Shape of Rail Head and Wheel Flanges.

CUMBERLAND, Md., April 4, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A communication on "Curve Resistance and Rail Wear," by W. Howard White, and your editorial comments thereon in your issue of March 23, have doubtless interested many of your readers who are forced to very seriously consider matters of the kind on railroads of very frequent and sharp curvatures. An account, therefore, of observations connected with a very peculiar line of railroad, and deductions formed therefrom, may not only contribute further to the interest of the subject, but furnish some additional instruction.

The George's Creek & Cumberland Railroad is a short line in the Cumberland coal region of Maryland, and used principally in the transportation of coal from the mines of the George's Creek Valley, to connections with the Baltimore & Ohio and Pennsylvania railroads, and the Chesapeake & Ohio Canal, at Cumberland, Md. The line was first located for a narrow gauge railroad; but it was later concluded to adopt the standard gauge in its stead and use the heaviest

class of consolidation locomotives and modern coal cars of the greatest capacity.

The gradients of the road are 3 per cent. for a distance of 12 miles to a summit, and thence descending $1\frac{1}{4}$ per cent. for 5 miles, and by various lighter gradients a distance of 5 miles further to the coal-loading points. The loaded trains have thus to be hauled up $1\frac{1}{2}$ per cent. and "let down" 3 per cent. gradients. The line on either side of the summit is one of abounding curvatures, in many places of 20 degrees, and at some points making complete semi-

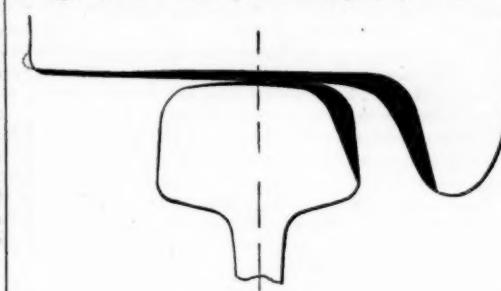


Fig. 1.

circles of the latter, and one reversing into the other. There are thus resistances at many points of the steepest grades and sharpest curvatures combined. After the opening of the road the apprehension, by the practical management, of excessive wear of rails and wheel flanges, was, as you may surmise, soon realized. That of the wear of locomotive flanges gave, indeed, most particular concern, even though certain adjustments had been made according to what was thought the best practice with locomotives for service under such conditions.

The examinations of rail and flange wear, made from time to time, revealed conditions invariably as shown accurately herewith by fig. 1, which shows the rail as worn on a 20 degree curve. It will be seen that the rail wore to an angle of about 20 degrees on the side; and that the flange, which had in the first place been given a somewhat conventional shape, wore very greatly into the fillet and thus into the

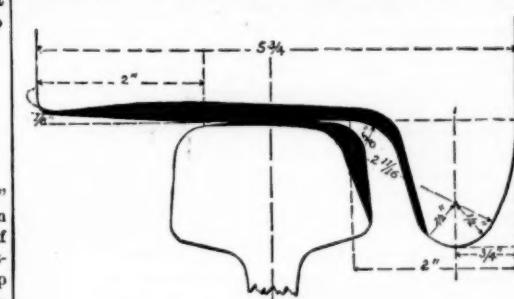


Fig. 2.

greatest depth of the flange. It was noted, from time to time, that as the wear proceeded on each, there was a constantly increasing resistance to wear as the surfaces shaped themselves—or were being shaped—and increased; and a point was reached which seemed to offer as satisfactory an amount of resistance as could be expected, or even desired. With such resisting surfaces it has been noted that late years of further wear can only be measured by the wear of former months. To arrive at this condition, however, it will be seen that not only has the life of the flange to be destroyed and much valuable metal to be worn from the rail, but that the amount

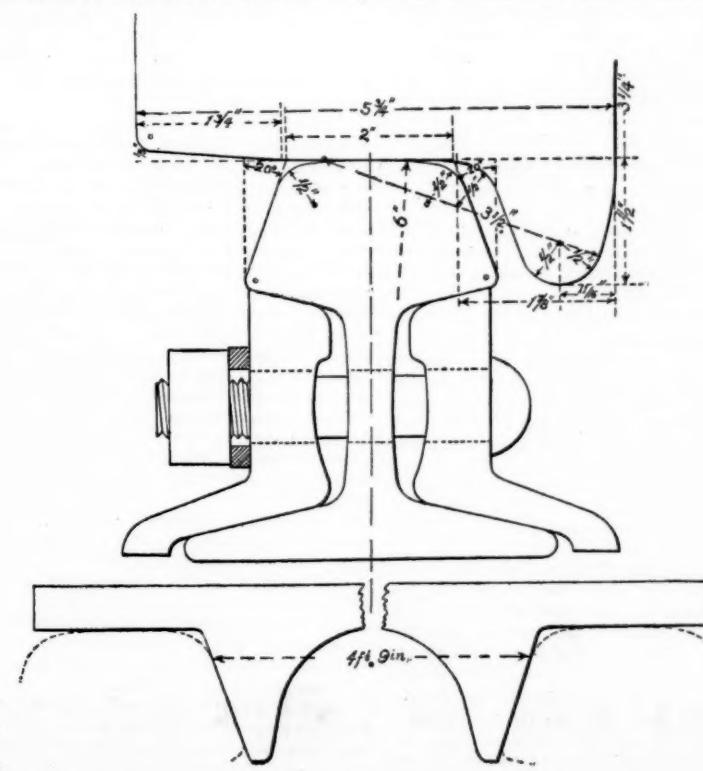


Fig. 3.

of play of the wheels upon the track has been permitted to increase to the insecurity and inefficiency of the motive power, the flanges getting into an excessively worn condition before any fair amount of service was obtained from the treads, and the re-turning of the tires entailing a great sacrifice of metal in order to shape up again the full new flanges.

Believing that the proper shape for the inside of the flange was suggested by the ascertained line of wear, or *line of greatest resistance*, the shape as shown herewith, fig. 2, was adopted. The results have been highly satisfactory. The flanges since then have worn but very slowly, and very largely increased service has been and is obtained from the tires before successive re-turnings, and on the life of the tire generally. In fact, it is considered that the flange survives almost equally with the tread before a re-turning, and little concern is now felt regarding unequal wear of the former.

It may be remarked here that the line of wear of rail and flange may be noted as not in agreement,—the flange being to a line more perpendicular than that of the rail. This is accounted for by the different conditions of the rails, which, upon curves, are worn to wear-lines shown, and upon tangents remain the shape of the full head of the rail, thus wearing the flange at different points and causing with it a compromise line as between the original shape of the rail and its worn head. It is suggested that it must be considered that the rail is worn in its peculiar shape mainly by the car wheels, rather than those of the locomotives from the preponderating number of the former which pass over it.

The present established shape for the locomotive flanges of this company is, however, regulated by the condition of its present rails upon the line, and by the above experience a new pattern of rail is suggested for the future, as per fig. 3 herewith. In its essential features, regarding this particular study, the head of the rail would be with sloping side to an angle as great as 20 degrees from the perpendicular—aggregating thus with the line of ascertained wear under the movement of traffic. Then, the shape of the locomotive flange would be to a line very closely in agreement—almost identical—with the shape of the side of the rail against which it is to bear. These are the lines for the fullest surfaces, practically, of resistance; and should, under the lessons already learned, afford the most satisfactory results. By such shapes the saving in wear of rail would preserve the proper gauge of the track, and, in wear of the flange, the proper play of the wheel upon the same. The track gauge, under such a system, should be constructed as shown by the sketch beneath, fig. 3.

In opposition to these views it may be urged: *First*, That by such broad frictional surfaces the resistance to tractive power would be thereby increased; and *Second*, That by such inclined sides to the head of the rail there would be a dangerous tendency or liability to mounting the rail and running off.

To the first, it may be said, with respect to *theory*, that it is worth the inquiry, possibly, as to whether there really would be an increase of friction by a distribution of the pressure within the limits suggested or defined, but that it can be stated, upon practical experience, that with the present standard of flange shape, upon the rail worn as described, the locomotives haul their trains around the curves with much greater ease than ever before, and that the train loads have been increased from time to time since its adoption. To the second, that as the rails, as so worn, and so used constantly, have never yet been "mounted" by a locomotive or car—though with a passenger train speed of 25 miles per hour around the shortest curves—no danger therefrom is to be apprehended.*

These conclusions are the results of observation and experiment upon this particular line of railroad. The conditions of other lines might lead, under the same course of examination, to conclusions at some variance with the above; but it is felt that the system pursued with the line of examination herewith would lead to profitable results to others in the same direction.

JAMES A. MILLHOLLAND, General Manager.

Permanent Way.

Summary of Returns received in Reply to circular issued under a Resolution pertaining to Roadway, adopted at a meeting of the Association of North American Railroad Superintendents, Oct. 11, 1887.

Forty-four returns were received from thirty-seven railroads, having an aggregate mileage of about 16,000 miles. Many interesting answers were received to the twenty-five questions proposed; some at considerable length. These have all been written out in tabular form, ready for the press, should the Association desire them printed. A great diversity of opinion was expressed and evidence of careful thought largely shown. On this account, as well as because of the abundantly characteristic nature of the replies, and the variety of reasons given for the views therein stated, it would be impossible to give in small compass anything like a fair or just abstract of these returns.

The following summary, therefore, is merely an effort to set forth, in a general way, under each question, the prevailing drift of opinion in that particular regard,—in short, a kind of composite photograph of the differing and sometimes conflicting ideas of forty or more practical men on practical matters relating to "permanent way" of railroads.

C. A. HAMMOND, Ass't Sec'y.

Question No. 1.—What do you consider the best section of

rails (a) for heavy freight traffic, (b) for fast passenger trains, (c) for average conditions?

The principal sections named have been the Sandberg, Sayre (Lehigh Valley), Pennsylvania Railroad and Northern Pacific; the weights per yard, (a) 70 to 100 lbs.; (b) same as (a), or, 70 to 75 lbs.; (c) nothing less than 60 lbs.—average, about 65 lbs.

Question No. 2.—What weight per yard of steel rail do you use?

The following are the different weights (in pounds per yard) mentioned: 50, 56, 57, 60, 60½, 61½, 62½, 63, 65, 66, 67, 68, 70, 71, 72, 75 and 76, the greatest weight (76 lbs.) being used on the Lehigh Valley and New York, Providence & Boston; the average used, as obtained from all the returns, is almost exactly 65 lbs.

Question No. 3.—Is it good practice to notch or drill the flanges of rails?

Thirty-six answer no, five in favor, or have had no trouble from that cause, and two allow at ends only.

Question No. 4.—What are the commonest defects you meet with in the wearing of rail ends?

Eight report few or no defects; four "nipping down," drawing or bending; seven, flattening; eleven, splitting; and eleven or twelve, imperfections in track, joints and quality of steel. It is noticed that with soft steel, rails are more likely to flatten at the ends, and with hard steel to split. Two report, "Do not understand the question."

Question No. 5.—How do you prevent rails (a) from "creeping;" (b) from giving trouble from expansion?

(a) About seventy-five per cent. rely on the angle splice-bar, notched for double spiking, with suspended joint and good ballasting; four report, unable to prevent creeping; three, by spiking through end notches; two use a centre fastening—the method in one case being to bolt a pair of angle-plates on centre of each rail and then spiking same to ties. Two use the "Fisher" joint.

(b) Nearly all depend on the angle splice-bar with elongated bolt-holes, but consider it essential to lay the rails with the requisite expansion spacing, using shims or spacing blocks, $\frac{1}{8}$ to $\frac{1}{4}$ in. thick, according to temperature, properly spiking joints, keeping bolts tight, and maintaining a good line and surface. One justly lays stress on having the track-layer a man of good judgment; another does tracklaying in summer time only, if possible. One reports the use (on a road of heavy grades) of the "Hilliard expansion chair," which gives the rail a run of 12 in. at a time.

Question No. 6.—What do you consider the best method of joint-fastenings, including forms of bolts, nuts and nutlocks?

About 87 per cent. prefer some form of angle splice-bar, as follows: Fifty per cent., the common two-tie angle-bar, 4 bolts; 7 per cent., the same thickened at the joint, one superintendent specially emphasizing the necessity of having this extra material, and as much of it as possible, on the outside plate, but not so as to come in contact with worn wheels and drivers, as is the case with one pattern where the added metal comes too far up on the ball of the rail; and thirty per cent. use the heavy three-angle-bar, 6 bolts (middle tie under joint), from 40 to 42 in.—in one case 48 in. long and weighing 42 lbs. The remainder of the returns (13 per cent.) are about equally divided between a plain fish-plate (well fitted with good bearing surfaces) and the "Fisher" joint. In one case a tie truss is used with common fish-plate.

Three returns favor the Harvey grip bolt: two the T-head bolt; the remainder the common cup-head bolt elongated under head—in two cases a steel bolt is used, $\frac{3}{8}$ and $\frac{5}{8}$ in. bolts, the latter size most used. The returns on nut-locks are: Verona, 18; Ruffner & Dunn (Excelsior), 17; National, 8; fibre washer, 2; Stark, 1; Noble, 1; one thinks a reliable nut-lock not yet found. Eleven mention hexagonal nuts, and nine square.

Question No. 7.—Do you favor the insertion of a thin steel bearing plate under the rail to prevent it from cutting the tie?

Three-quarters of the replies are in the negative, and six report that they have never used it, expressing no opinion of its merits. Of those answering "no," some 20 assign no reason; other comments are somewhat as follows: "No anvil under our joints," "do not favor insertion of any kind of metal under the rail," "consider it a step backward; too much toggling and too many pieces are objectionable," "liable to curl up outside of rail-base, or bend, and rail to wear rounding," "expensive and unnecessary; if used, track would not be safe from spreading on sharp curves, as spikes would not hold against thrust of rail on smooth plate." One or two favor such a plate only at joints where strap fish is used, or at heel and toe of frogs. Three or four consider them uneconomical except for chestnut or soft cedar ties, or where soft ties are used on curves. One says "yes," without comment; and one, "yes, except for expense."

Question No. 8.—What amount of broken rails do you have, at what times of year, and from what causes, so far as known?

Two report none; seventeen, very few. Others mention, less than 1 per mile, 1 to $1\frac{1}{2}$ miles, 1 to 2 miles, 1 to 90 miles, 24 to 350 miles, 3 or 4 to 225 miles, 51 to 172 miles (double track), 10 or 12 in 100 miles, 25 in 130 miles, 70 in 100 miles, a fraction of 1 per cent., $\frac{1}{4}$ of 1 per cent., 1 in 7,000 rails per annum, 19 in 30,000 rails per annum, and one instance of 48 in 36,808 rails in 15 years.

Nineteen report rails breaking chiefly in the winter season, and three at all times of the year.

Causes given are: Defective steel, too hard, flaws, bad material and proportion, "dent in web of rail made by gag when rails were straightened at mill," old age—worn out, punching rail, notching rail, broken wheels and derailments,

"sweating" of rails in fall and spring, "crystallization" from increasing service, heavy engines and over-loaded cars, wide joints, frost, frost heaving road-bed and bad drainage, track not sufficiently tamped and unequal bearings.

Question No. 9.—What kind of ties do you use and which do you consider the most durable,—giving life of each, also standard dimensions and where cut.

Thirty of the roads report using oak; seventeen, chestnut; eight, cedar; five, tamarack or hackmatack; five, yellow pine; two, common pine; two, hemlock; and one prefers butternut—life, eight to ten years. Many varieties of oak are mentioned, such as burr, white, rock, post, chestnut, yellow-bark, etc., the life of the inferior kinds being only from three to five years, while that of the best averages eight and nine years; it is considered best cut in winter time, when the sap is down, and from heavy soil. The average life of chestnut,—white chestnut and second growth preferred, bark off, is given at seven and a half years; it is cut and used mostly in Connecticut, central Massachusetts and New Hampshire. The life of cedar is eight to ten years; one road calls it fifteen to sixteen years; it is cut in Michigan, Maine, Canada and near Bay Chaleur in Nova Scotia. Some Virginia cedar or juniper, from Great Dismal Swamp, has been used, having a life of eight to eleven years. Tamarack, yellow tamarack, or hackmatack, is much harder than cedar and holds spike well on curves, but lasts only from four to seven years; one road, however, putting it at eight to ten years; cut in Canada and Nova Scotia. Yellow pine, from Georgia, Florida, etc., lasts from six to ten years; used chiefly on roads of the South Atlantic or Gulf States. Common pine is used in Michigan and Nevada (Lake Tahoe); life, five to ten years. Hemlock is used to some extent in eastern New England; life, about five years.

The varieties of oak so largely used are found throughout the heart of the continent, comprising the Lake states and those occupying the Ohio and Mississippi valleys, and are generally used by the railroads running in those regions, although some cedar is used in Michigan, Illinois, Missouri, etc. One return states the durability of the timber in the following order: red cedar, burr oak, white cedar, white oak, black walnut, red elm, tamarack.

The standard sizes are $8\frac{1}{2}$ ft. \times 7 in. \times 7 in. and 8 ft. \times 6 in. \times 6 in. or 7 in.; some southern roads, where ballast is poor, use 9 ft. \times 6 in. or 7 in. \times 9 in. or 10 in. About one-half the roads cut their ties from timber growing along their line.

Question No. 10.—Do you prefer a plain spike or the "hollow-back," and why?

Three-fourths of the returns are decidedly in favor of the plain spike; others have never used the "hollow-back"; three are in favor of it, and two express no preference. Some of those preferring the plain spike assign reasons as follows: Four say it has more strength; two that it is better manufactured; others say the plain spike does not spread the fibers of the tie so much and holds better, prevents water running into the tie, does not bend in driving nor require two kinds of claw-bar to draw; that the hollow-back breaks in pulling, has no advantages over the other, and that the fallacy of the hollow-back adding to the "staying" qualities has long been exploded. Of those in favor of the hollow-back spike, one says he uses the plain spike, but the hollow-back has undoubtedly points of superiority; another, that it is stronger, holds in tie better (he uses mostly soft ties); and a third, that it does not so readily work loose.

Question No. 11.—What kind of ballast do you prefer, stating reasons? What kind do you find it necessary to use?

Of forty-three replies, twenty-one prefer gravel; seventeen, broken stone; three cinders, and two furnace slag. As to the ballast actually used, nineteen report gravel; three, gravel and sand; one, gravel and cinders; one, gravel and broken stone; one, sand; three, broken stone; two, slag; and one, broken stone and slag. Ten do not report, and one (a southern road) uses no ballast. Of the seventeen reporting in favor of broken stone, only three say they are using it, while eight or nine of them use gravel and two slag, etc. One who prefers clear gravel is actually using limestone rock and marble almost exclusively, costing \$1,200 a mile to put up track in first-class manner with 10 inches crushed stone under ties. One prefers stone, but uses gravel because there is no rock on his line.

The following are among the reasons given for preferring clean gravel to broken stone: Less cost, less expense for maintenance, easier and cheaper to handle, little dust and small amount of labor on wet roadway, less expensive to rolling-stock and in wear of rails, better riding track, more elastic road-bed, smoother track and better surface. Those who prefer broken stone (uniform size) say that it does not hold water to freeze and heave, nor waste by rain or wind, nor grow weeds, nor make dust; that it is more durable, makes better line and surface, better drainage, and the ties last longer—in short, better service.

Blast-furnace slag and cinders are commended and used, especially in wet cuts, because it is easy to handle, indestructible, permits thorough drainage and is not affected by frost.

Question No. 12.—What elevation do you give to curves of different radius, and for what speeds? How much do you spread gauge of track on curves?

A great diversity of practice is shown, from $\frac{1}{4}$ in. to $1\frac{1}{2}$ in. per degree, and for speeds of from 20 to 60 miles per hour. About 1 in. per degree seems to be the prevailing standard, but not on curves exceeding 4 degrees to 6 degrees, the elevation being less on sharper curves, which are either not allowed in main track or are run over at reduced speed. The speeds given, for which elevation is calculated, average exactly 40 miles per hour.

As to spreading gauge of track on curves, seventeen re-

* "Runaway" cars upon the line have passed around such curves at terrific rates without mounting the inclined heads of the rails.

plies say no, and some thirteen more only allow it on curves exceeding 5 degrees or 6 degrees—in one case 12 degrees. Some allow $\frac{1}{8}$ in. per degree, some $\frac{1}{6}$ in., and some $\frac{1}{4}$ in. for sharper curves than 3 degrees to 8 degrees. In one case $\frac{3}{4}$ in. is allowed for a 19-degree curve, and in another and very exceptional case, $1\frac{1}{2}$ in. spread is used on a 27-degree 20-min. curve.

Question No. 13.—Do you consider it preferable to lay track with "square" or "broken" joints?

Twenty-nine returns favor broken joints; twelve square, and two do not answer. The opinion, so far as expressed, would generally indicate that square joints are better if the ballast is poor; that they are less expensive to keep up and keep in line, and that they are easier on rolling-stock and in riding qualities. On the other hand, broken joints with heavy rail and good ballast are considered stronger; and several consider them without qualification much the best.

Question No. 14.—Where do you need to use "track braces"?

Nearly all the roads use them on guard rails, frogs and point switches; and about two-thirds have them on curves of 4 or 5 degrees and upward; two allow them in main track only to keep rails from spreading from high shimming; and three not at all, except for guard-rails, etc. In three instances when used on curves they are placed against both outside and inside rails. One reply mentions the use of blind drivers as obviating the necessity for track braces.

Question No. 15.—What thickness of shims do you allow in track, how made, and what provision for having spikes hold at such places?

The thickness varies all the way from $\frac{1}{8}$ in. to 6 in. (in the latter case extra cross-ties are put in, to which track is spiked to keep same from spreading); the usual limit is 2 in.—it a few instances 3 in. Five or six roads report not using them at all, on account of climate or good ballasting. The shims are usually made at the wood shops, or split by the section-men as needed, from oak, piling butts, offal of car timber, etc., or are bought all made and bored for spikes. In one case the standard size (different thicknesses) is 8 in. square—the full block used for joint ties, and half block for other ties.

Question No. 16.—How many cases of rail-spreading have you had, and from what causes?

Thirty-three returns report no case of rail-spreading, including two or three who confine their answer to main line. Five report cases occurring in yards from rotten ties. Two or three report "very little trouble from this cause." One reports no derailments on this account, but in two cases has "rolled" the rail by side pressure from speed or snow-drift. A Southern road reports one or two cases after "change of gauge," due to insufficient spiking.

[In the opinion of the committee, the rails will never spread under the passage of trains while the wheels are running on the rails, when the track is on good, sound ties and well spiked; that cases of accident attributed to spreading of rails are more likely to have been caused by derailment from some other cause than deficient strength of ties or improper spiking, and that in such cases hasty conclusions have been reached from simply considering the effect, instead of carefully locating the cause.]

Question No. 17.—What is the standard form and length of guard-rails opposite frogs?

The length averages 15 ft.; some adopt same length as the frog. They are usually made, six of 150 or 175 ft. radius; in one case a flat ellipse is preferred for main line and arc of small circle for turnout. Some make the middle section of the guard-rail straight, parallel with main rail, then flare the ends—either curving or on an angle of 25 degrees. The distance between the ends of guard-rail and the main rail varies from $2\frac{1}{2}$ to 14 in., averaging $6\frac{1}{2}$ in. The flange-space is usually $1\frac{1}{2}$ or $1\frac{1}{8}$ in., sometimes 2 or $2\frac{1}{2}$ in. In one instance the guard-rail for a double-throw switch is extended from the crotch frog to main frog, a distance of 38 ft. On another road the ends of guard-rail are turned 18 in. at right angles. Several roads adopt the standard recommended by Roadmasters' Convention.

Question No. 18.—How do you guard-rail your bridges?

Eighteen replies mention outside timbers only; fifteen, inside guard-rails; and five use both, not including two who use the Latimer bridge-guard. One road (the P. C. & St. L.) uses a standard of its own. Two use no guard-rails, one deeming them unnecessary. Inside rails are preferred to be of same height as main rail; three roads use old rails. The distance from guard to main rail varies from $2\frac{1}{2}$ to 6, 7 and 8 in., the latter usually adopted. The general practice is to extend the inside rails beyond the approach-ends of the bridge (from 15 to 300 ft.) and curve them to a point midway between the rails; in some cases the point is protected by a special casting fitted and bolted, and in others by frog-points; on one road the rails are left 14 in. apart at the ends, to prevent bolts from low-hung brake-rigging on some foreign cars from catching in the guard-rails if brought together.

Where outside guard timbers are used they are, as a rule, notched over the ties and bolted, say to every fourth tie, and in some cases (by lag screws) to every tie, the depth of notching being from 1 to 2 in., the latter used with 8 in. \times 10 in. timbers. The size of guard timber varies from 4 in. \times 5 in. to 8 in. \times 10 in., the average being 7 in. \times 8 in. The distance of timber outside of rail varies from 7 to 18 or 19 in., the average being 14 in.; in some cases the guard timbers are placed at the ends of 10-ft. ties. They are sometimes extended and flared at ends of bridge by curved iron.

Question No. 19.—What kind of foot-guard do you use, and what is its durability?

Twenty-six replies say none at all; two specify the use of cinders in yards in some cases; eleven mention the use of plank pine or oak, lasting, perhaps, two or three years. In one case,



Sixty-degree Curve.



Forty-degree Curve.

CURVES AND TRESTLES ON THE HAWAIIAN RAILROAD.

For description, see page 234.

oak blocks were said to last "one and a half times as long as the ties under them." Two roads are using the "Hart" guard, and one the "Atwood," with a piece of plank fitted in and spiked to the ties. In one or two instances a "foot-guard" seems to be something quite unknown.

Question No. 20.—What, in your opinion, is the best kind of switch and frog?

Thirty-two returns give decided preference to the point or split switch for all purposes (six including with it the automatic stand); eight favor the Wharton switch for main line and the split switch for yards, the Wharton (with improved Robinson stand) being considered the safer and more durable (for main line use), although the first cost is much greater. Mention is made of the "Hopkins & Bryant" switch for single track, using point switch for double track. One roadmaster making return is undecided: he would use a combination of different kinds to produce the best switch; likes the Clarke and Jeffery rails, preferring three rods instead of five or six; approves the principle of shimming the fly-rails as in Clarke's switch.

A majority favor the spring-rail frog, particularly for main line,—confining the stiff-rail frog to yards, although one prefers the spring-rail for all cases; another prefers the spring-rail for durability but thinks the stiff frog safer. Of the dozen or so who like the stiff frog best, three use a bolted frog with throat, point and back filling, with fish-plates or straps on outside of wing-rails to take all bolts; four like a clamped key-frog. One rightly says the stiff frog should always have a riveted plate under the point. Another, while favoring the spring-rail for main line and the stiff-rail for yards, adds, "but protect me against all kinds of key frogs." Several kinds of frogs are mentioned as good makes,—the Ramapo, Wier, Elliott, Jersey City Iron Works and Pennsylvania Steel Co. One return specifies "a solid crucible-steel frog with double angle in wing, the wing-rails to be made reversible so that the wrong rail cannot be sent to section-foremen when ordered."

Question No. 21.—What system of road inspection and premiums do you adopt?

Eleven roads report that they have no special system, and seventeen say no premiums, including one that is opposed to the practice; another finds "an occasional 'voucher' to worthy and deserving men brings about better results." Four or five report a premium system. The prizes are, say \$50 to the best division and second prize \$25, and \$25 or \$30 to the best section; second prize \$20. Three roads make

regular annual track inspections by officials interested. One has the section foremen go over their division every spring and fall and ballot to see which section has made the most improvement during the year, the highest vote gaining first prize, next highest second prize. Another has three official inspections per annum, marking every mile for line, surface, level, frogs and switches, drainage and policing. A third has bi-monthly inspections by division superintendent, roadmaster, etc., taking plenty of time to make a thorough inspection. Others rely on the frequent and periodical inspection by the superintendent, roadmaster, etc., one officer remarking that the best and only reliable system is for a good roadmaster to walk his track personally at least once in three months.

Question No. 22.—What are your rules regarding patrolman or track-walker?

Eight roads report that they have no track-walkers. Fifteen rely chiefly on their section-gangs, going over their sections once or twice a day, usually the first thing in the morning and (especially in winter) the last at night; furthermore, in bad weather and dangerous places the men must be out with signals, etc., day or night. In some cases the section foreman is expected to go entirely over his section every day and see that everything is safe. In about a dozen instances regular patrolmen are employed; some both day and night, some in bad weather only, or after heavy storms, and others required to go over their sections two to four times a day. On several roads patrolmen are out all the time and are assigned prescribed limits.

Usually the track-walker passes over his section before the first passenger train in the morning, and, if on at night, endeavors to keep ahead of schedule trains. In one or two cases the patrolman uses a light hand-car or velocipede, carrying lanterns, tools, signals, etc.

Question No. 23.—How many section-men do you allow per mile of single track; per mile of double track? How many in all and how organized?

There is considerable fluctuation in practice. The average comes out—1 man per mile of single track in summer and $\frac{1}{2}$ man per mile in winter. For double track, $1\frac{1}{2}$ man per mile in summer and $\frac{3}{4}$ man per mile in winter. The average length of a section, single track, is 5 to 8 miles. Double track, 8 to $8\frac{1}{2}$ miles. On some roads the section foreman is given an assistant called a "second hand," the remaining three or four men of the gang being designated "laborers."

The usual organization is five or six men to a section under

a foreman or section master, who reports to a supervisor in charge of a division of from 80 to 160 miles, all being under an engineer or general roadmaster who, in turn, reports to the superintendent. In one case as many men are put on any given section as are necessary to put it in good condition as early in the spring as possible, and then reduced in number as can be done to advantage.

Question No. 24.—What is the annual cost to you per mile of single track for wages of section hands, not including cost of removing ice and snow?

The average of thirty-three returns giving figures is \$352 per mile per annum.

Question No. 25.—What is the average cost per mile of single track for labor in laying superstructure, including distribution of material, track work, ballasting, tamping, etc., but exclusive of preliminary grading?

The average of nine more or less careful estimates is for general ballast \$1,118 per mile; the average of a dozen evident guesses is about \$400 per mile. The details of four of the estimates above mentioned are as follows:

First.—Average cost per mile of single track (consisting of original laying of steel, surfacing and ballasting) is about as follows: Where ballasted with gravel, \$1,941.50; with broken stone, \$3,251.50.

Second.—\$1,240 per mile for 18 in. of ballast.

Third.—Can lay and surface for \$400 per mile; ballast with gravel easily loaded, 10 to 50-mile haul, for \$750 to \$1,000 per mile; with broken stone, same haul, for \$1,200 to \$2,200 per mile.

Fourth.—With gravel, ashes or fine cinder, \$825; with slag, \$1,300; with stone, \$1,450. This estimate is when all material is furnished at beginning of mile, and includes loading and distributing of ballast. Depth of ballast, 8 in. under tie.

The following are the names of the different roads sending replies to the circular, also the names of the officials making the returns from which the foregoing summary was derived:

Boston & Maine (Eastern Division), D. W. Sanborn, Supt. Boston, Revere Beach & Lynn, C. A. Hammond, Supt. Central Vermont, John Foss, Gen. Supt. Central Vermont (Rutland Division), E. W. Horner, Roadmaster. Cheshire, R. Stewart, Gen. Man.; R. Hyland, Roadmaster. Chicago, Santa Fe & California, D. J. Chase, Gen. Supt. Chicago, St. Louis & Pittsburgh (Western Division), Chas. Watts, Supt. Chicago, St. Paul & Kansas City, W. I. Fox. Cincinnati & Muskingum Valley, F. G. Darlington, Supt. Cleveland, Columbus, Cincinnati & Indianapolis, Robert Blee, Supt. Concord (Main Line), H. E. Chamberlain, Supt.; Perry A. Eaton, Roadmaster. Concord (Concord & Portsmouth Division), W. P. Burbank, Roadmaster. Connecticut River, J. Mulligan, Supt.; John R. Patch, Roadmaster. East Tennessee, Virginia & Georgia, F. K. Huger, Supt. Fitchburg, H. A. Phillips, Div. Supt. Georgia Pacific, J. Y. Sage, Gen. Man. Grand Rapids & Indiana (Northern Division), J. M. Metheany, Supt. Grand Rapids & Indiana (Southern Division), P. S. O'Rourke, Supt.; S. G. Scott, Roadmaster. Illinois Central (Mississippi Division), H. W. Clarke, Supt. Indianapolis & St. Louis, T. W. Burrows, Supt. Lake Shore & Michigan Southern (Eastern Division), C. B. Couch, Supt.; W. H. Courtney, Roadmaster. Lehigh Valley, H. S. Goodwin, Gen. Supt. Lehigh Valley (New Jersey Division), J. Donnelly, Supt. Long Island, I. D. Barton, Gen. Supt. Michigan Central, J. B. Morford, Div. Supt.; J. D. Hawks, Chief Engineer. Narragansett Pier, G. I. Lamphear, Supt. and Chief Eng. New London Northern, C. F. Spaulding, Supt. New York & New England (Providence Division), L. W. Palmer, Supt. New York & New England (Western and Springfield divisions), C. H. Platt, Supt. New York, New Haven & Hartford, O. M. Shepard, Gen. Supt.; Isaac Pressy, Roadmaster, N. Y. Div. New York, New Haven & Hartford (Hartford Division), C. S. Davidson, Supt. New York, New Haven & Hartford (Shore Line Division), E. G. Allen, Supt. New York, Providence & Boston, J. B. Gardiner, Supt.; S. A. Wheeler, Roadmaster. Ohio & Mississippi, C. C. Bent, Supt. Pittsburgh, Cincinnati & St. Louis (Little Miami Division), Ralph Peters, Supt. Providence, Warren & Bristol, Waterman Stone, Supt. Savannah, Florida & Western, R. G. Fleming, Supt. Staten Island Rapid Transit, F. S. Gannon, Gen. Supt. Toledo & Ohio Central, T. M. Peeler, Supt. Virginia & Truckee (Nevada), C. C. Atherton, Roadmaster. Wabash, K. H. Wade, Gen. Supt.; Chas. Hansel, Engineer. Western Railway of Alabama, Atlanta & West Point, and Cincinnati, Selma & Mobile, Cecil Gabbet, Gen. Man.

Curves and Trestles—Hawaiian Railroad.

For illustration, see page 233.

We give herewith illustrations of curves and trestles on the Hawaiian Railroad, a brief account of which was given in the *Railroad Gazette* last June. This railroad is 20 miles long, with 3-ft. gauge, and skirts the seacoast, its traffic being carrying sugar to the ports. There are several 60-degree curves on the trestles, and one of 70 degrees. We are told that there has never been a derailment on curves, nor fatal accident.

The engravings are from photographs sent to us by Mr. Charles White, the Superintendent of the road. It will be seen that an inside guard-rail is placed on the inside of the curve and that all three rails are solidly blocked in both directions.

The heaviest grade is 118 ft. per mile. The road now operated is laid with 20-lb. English steel rails, and equipped with rolling stock partly English and partly American. For

some time it has been intended to build about 70 miles more, using a 40-lb. rail and equipping with American rolling stock throughout. Nothing will be done at present, however, towards carrying out this extension. Probably it is thought wise to await developments of the enterprises and schemes of Claus Spreckels before putting money into a road which must depend entirely upon the sugar traffic for any returns, and no effort is now making to get capital for further work. Those who are most interested, however, do not anticipate a very long delay in completing the longer line which is projected. This will run across a high plateau, traversing the length of the island, and would bring into communication with the ports at either end a narrow but extremely fertile strip of territory which can now be of little use for cultivation.

The Keystone Freight Car Seal.

The accompanying engravings, which are full size, represent an improved seal for securing freight car doors or other similar purposes invented by Mr. A. B. Schofield. The seal, as will be seen from the illustrations, is similar in principle to the ordinary lead and wire device now in universal use, and it differs from that chiefly in being stouter and more carefully made. It is more easily and surely applied to the car, and can be inspected with certainty more rapidly than the old pattern can be examined in the usual unsatisfactory way.

The bail, as will be seen by fig. 1, is of steel wire which makes



FIG. 1.

a fastening as strong as an ordinary padlock. To insert it in the soft metal body the ends are sprung together so that when it has been pushed home the bent ends engage automatically in the notches (see fig. 2) and the whole is securely held together while the press is being adjusted and used. The form of the metal, narrower at the lower than at the upper end, is such that it fits into the space in the sealing-press perfectly, thus rendering the adjustment of the latter as easy in the dark as in day light, the seal never going in too far or stopping short.

The press is made with great care, all the parts being steel drop-forgings, and the impressions made must be always accurate and even. The die is forced home by a cam attached to a ratchet wheel which is revolved by four strokes of the lever-arm of the press. This arm having been brought down so that the die is in contact with the metal, the press cannot be pulled off from the seal until the cam-wheel has made a complete revolution. It is thus impossible for a careless or hasty sealer to send off seals imperfectly squeezed.

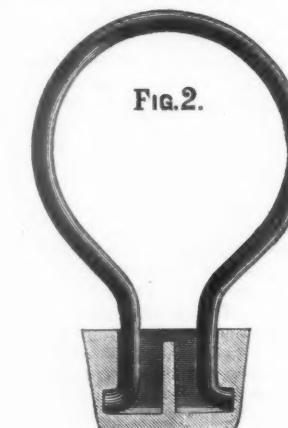


FIG. 2.

The proper impression having been made, the completion of the revolution of the cam releases the press. The press is very powerful, so that comparatively hard metal may be used in the seals, and it is exceedingly plain and simple, being apparently little if at all more liable to damage or disorder than the ordinary plain lever press.

The superiority of this device over the ordinary lead and

wire seal is apparent without argument, the faults of the latter, such as the ease with which they can be surreptitiously taken off and replaced, the difficulty of enforcing careful work by sealers, and of making a reliable examina-



FIG. 3.

tion at inspecting stations, being well known; and its one great merit is cheapness. While the cost of metal in the device here shown and of additional care in manufacture no doubt make the price considerably higher than that of the ordinary patterns, the greater strength and the security given by these seals, and the certainty that when they are attached to a car they will withstand all friction and chafing and go through to the destination of the car (whereas common wire seals sometimes break off and are lost) tend to indicate that these seals may be as economical in use as any others. They are made by the Keystone Seal & Press Co. Limited, 170 Broadway, New York City.

The Superintendents' Meeting.

The annual meeting of the North American Association of Railroad Superintendents was held at the Hotel Brunswick, New York City, on April 9 and 10, President H. F. Royce in the chair. On the first day (Monday) the attendance was small, and but little business was done, though the time was profitably spent by the members between sessions in informal conversation which constitutes such a useful feature of most gatherings of this kind. The report of the committee on roadway was read by the secretary and ordered printed. It will be found in another column.

The Committee on Transportation made a report on the proper method of distributing time-tables to employés. They recommend that a notice be placed on the bulletin boards at all terminal stations and ends of divisions, both in round-house and in train or yard offices reading: "Change of time on . . . next . . . Get new time-table, No. . . . taking effect . . ." This to be posted at least five days before the new table is to go into effect. Station and track men to be notified by telegraph the day prior to the sending out of the tables. Distribution to be done by Division Superintendent or Train Master, or in case of road men, by Roadmaster, and enginemen through Master Mechanic, if desired. Proper receipts to be taken, and work-train-men and others not readily accessible to be ordered to acknowledge by wire. No discussion was had, owing to the small attendance.

Officers for the ensuing year were elected as follows:

President, C. S. Gadsden, Charleston & Savannah; First Vice-President, L. W. Palmer, New York & New England; Second Vice-President, J. B. Morford, Michigan Central; Third Vice-President, T. W. Burrows, Indianapolis & St. Louis; Secretary, Waterman Stone, Providence, Warren & Bristol; Assistant Secretary, C. A. Hammond, Boston, Revere Beach & Lynn; Treasurer, R. M. Sully, Richmond & Petersburg; Executive Committee, C. W. Bradley, West Shore; W. F. Stark, Dayton & Union; R. G. Fleming, Savannah, Florida & Western; D. W. Sanborn, Boston & Maine, and the President.

On the second day (Tuesday) more members were in attendance, but as a large portion of them had made other appointments at an early hour, the meeting was very short, and drew out no discussion on the reports read the previous day.

The new president, Major Gadsden, occupied the chair. A vote of thanks to the retiring officers was passed, and St. Louis was selected as the place for the next meeting. The selection of a date, in September or October, was left to the executive committee.

Mr. CHARLES A. GILCHRIST, Superintendent of the Fort Madison & Northwestern, gave his experience in some details of road work. He uses burnt clay ballast, finding it economical where wood or refuse coal is cheap. It is burnt in kilns of alternate layers of wood and clay in pyramid form, the burning occupying several days. Mr. Gilchrist had been able to ballast but a small part of his road, but what little he could afford to put in was used to alleviate the bad effects of frost-heaving near bridges and cattle guards. This road lies through a clay soil and has no ballast of any account, the consequence being that in winter every bridge and cattle-guard appears to be badly settled. To mitigate this unevenness in the track he puts in about 10 or 12 in. of the burnt ballast adjoining the abutment and extends it out about 50 ft., carefully graduating the depth from 10 or 12 in. down to nothing. By this means he has succeeded in greatly improving the condition of his track.

Mr. Gilchrist related a case of bridge testing in which the marked effect of blows upon the structure was accidentally shown. The regular test of a heavy engine showed nothing

remarkable, the deflection being about $\frac{1}{4}$ in.; but in the train attached there was a car (of not unusual weight) which had a flat wheel; this at once caused a deflection of about $1\frac{1}{2}$ in. The size of the wheel and of the flat spot and the speed of the train were not stated.

In answer to inquiries several gentlemen gave their experience with soft soil in cuts. Several related the usual experience of unsuccessful attempts at retaining the earth in place by plank barriers, putting on loam, etc. Successful experience with the basket willow was reported from Connecticut, this tree growing where grass will not, and even affording a supply of wood which can be cut without destroying the life of the stumps, new sprouts immediately appearing. In Virginia pokeberry trees are planted for this purpose. Mr. Platt, of the New York & New England, after failure with gravel and even with stone retaining walls, put in two years ago a cobhouse structure of old ties at the foot of a very troublesome cutting. The first spring the mud ran down and partially filled the interstices of the piles of ties, and the second year that operation was completed, so that now there is a serviceable retaining wall composed largely of the material which it is desired to retain. The ties are piled high enough so that the slope from the top of cut is very moderate; the bank shows no tendency to further slipping.

The Association accepted an invitation from General Superintendent Goodwin of the Lehigh Valley to inspect the working of the train telegraph on the New Jersey division of that road on Thursday, April 12.

The Flexible Steel-Clad Baker Heater.

The Baker Heater Co., with Mr. W. C. Baker, the inventor of the "Original" Baker heater, at its head, has been quietly yet persistently at work for the past three years in practically demonstrating that, so long as the heat must emanate from fire somewhere, that "somewhere" should be directly within the place where the heat is wanted—the car itself.

The latest form of the Baker heater as shown in the accompanying engraving is claimed to be absolutely safe in wrecks and collisions. These heaters are made from steel that will stand 60,000 lbs tensile strain with 50 per cent. reduction of area. It is expected that the toughness and elasticity of the metal will prevent any rupture in a collision, although the casing may be bent and buckled. The most important improvement made in the latest form of the heater is in the outer casing, which is welded solid and seamless. The absence of riveted joints renders the strength more uniform, and absence of rivet holes removes the usual starting point of fracture. It is also argued that fire cannot escape unless the casing is absolutely ruptured.

This engraving shows a sample of the $\frac{1}{4}$ in. steel casing bent cold, and justifies the toughness and claim of the makers for its elasticity.

The draft is admitted by $\frac{1}{8}$ -in. holes and the smoke escapes by $\frac{1}{4}$ -in. holes. It is claimed that in case of a smash the hot coal would be so

atomized in being pushed through these small apertures as to be harmless.

By reference to the accompanying cut it will be observed that the door to the ashpit is opened by sliding upwards, and closed and self-bolted by sliding downwards. These doors, as well as a sliding safety plate over the fire, are intended to be always kept closed while the car is running, and this necessitates the automatic draft regulator as shown. With the old style Baker heater, these doors have to be opened and closed by hand in order to regulate the draft to the fire.

It will be seen on examining the illustration that the draft can be regulated by shifting the spiral spring to or from the fulcrum of the lever which controls both the admission of air to the fire, and the escape of the products of combustion. For instance, if the controlling spring is hooked on the lever where it is marked "10," the draft will close when the pressure gauge denotes 10 lbs. per sq. in. pressure in the heater. The maximum working pressure is 40 lbs. per sq. in.

The compact Baker heater, illustrated and described in the *Railroad Gazette* of March 11, 1887, was fitted with this form of automatic draft regulator.

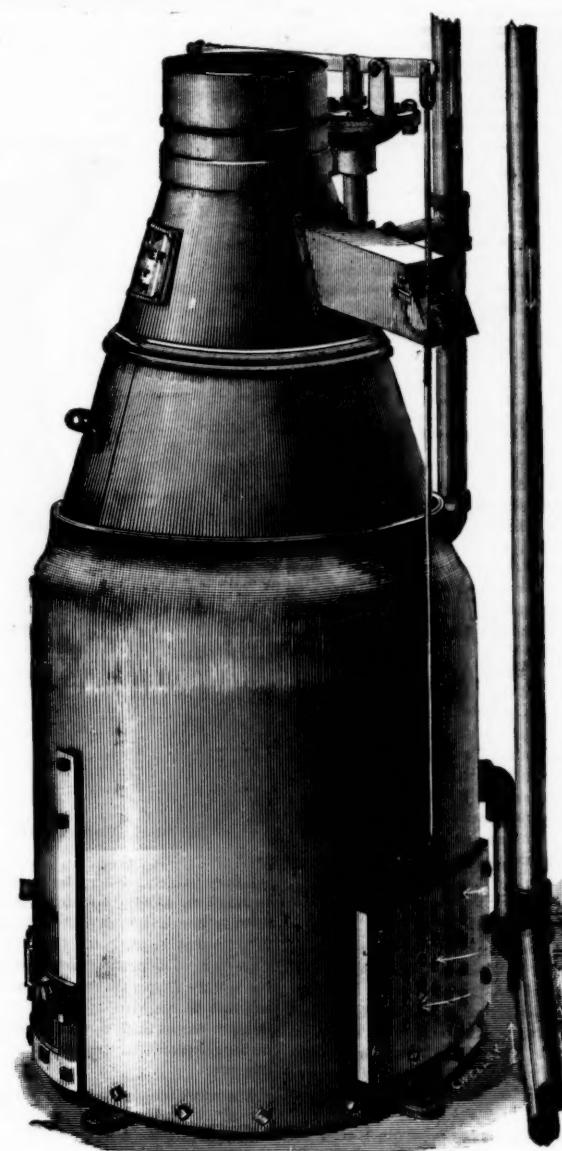
This latest improvement of Mr. Baker is designed to render the Baker heater perfectly safe, and at the same time independent of a locomotive. A car fitted with this device can, it is claimed, be run more safely than with steam from the locomotive.

The circulating drum is now made of wrought iron, and thus a minor source of possible danger from flying fragments of cast-iron, in case of wreck or explosion, is removed.

General Time Convention.

The spring meeting was held at the Hotel Brunswick, New York City, on Wednesday, April 11, 79 roads being represented by 97 delegates. The date fixed for the spring change of time is May 18.

There was no discussion of any consequence, the various reports of committees being adopted by substantially unanimous votes. Commander Brown, of the United States Naval Observatory, addressed the Convention on the subject of transmission of standard time. The Executive Committee recommended that there be a standing committee of nine, three members to be elected each year, to receive and consider all suggestions or proposed amendments in connection with the uniform code of train rules. This report was adopted and the following gentlemen elected as the committee: K. H. Wade, Wabash; H. B. Stone, Chicago, Burlington & Quincy; E. B.



THE FLEXIBLE STEEL-CLAD BAKER HEATER.

Made by the BAKER HEATER CO., New York.

Thomas, New York, Lake Erie & Western: H. Walters, Atlantic Coast Line; J. T. Harahan, Louisville & Nashville; C. D. Gorham, New York, Chicago & St. Louis; R. Peckinpaugh, Pennsylvania; M. S. Belknap, Central of Georgia, and D. J. Chase, Atchison, Topeka & Santa Fe.

The committee on the relations of the convention with other organizations made a report recommending that the convention take up for consideration subjects referred to it by other railroad conventions, and that technical questions brought up in the Time Convention be referred when desirable to such other railroad organizations as the convention should elect; provided, however, that all questions from such other organizations be first referred to the Executive Committee, and that reference of questions by the Time Convention to them should always be made through the Executive Committee. This report was adopted. The committee on car mileage and per diem rates made a report which follows (slightly condensed):

The Committee has held two sessions—at Chicago, Dec. 8, and at New York, April 9.

Inquiries were sent in December to all roads in the convention. Of the replies received, 45 roads expressed themselves in favor of adopting the per diem and mileage rates as recommended by the Trunk Line Association, 24 roads were opposed, and ten were not ready to reply. Careful consideration was given to the negative replies; the objection was generally not to the plan itself, but to some detail of it; or a suggestion that some better plan of handling cars might be adopted by the transportation departments; but no definite plan was suggested in any case.

The reasons which induced the trunk lines to adopt their rules appear to apply with equal force to every road in the country, and are, therefore, quoted as follows:

"It is believed that under the present system of basing compensation for car service on a mileage rate there is no incentive for the roads to make any exertion for the prompt handling and return of foreign cars. Statistics show that the average mileage of freight cars has been reduced almost in proportion as the cars have increased in number. The present equipment of freight cars is thought to be sufficient, if not more than sufficient, to meet the demands in the busiest season, if properly handled, and further increase in rolling stock would, therefore, be unnecessary. The statistics submitted also show that the average mileage made by trunk line cars on foreign roads does not exceed from 17 to 25 miles per day, which would indicate that the cars are moving only two hours out of each twenty-four."

It was considered that a simple per diem charge might operate unjustly to the initial and terminal roads on which cars have to be detained for legitimate purposes; that a mileage charge should only be made to cover the repairs of the cars, and the per diem should cover only a reasonable interest on the cost of the cars during the time they were kept on foreign roads. It was agreed that the charge for repairs

of cars should be fixed at one-half cent per mile run and the per diem at 15 cents per day, being equivalent to an interest charge at the rate of 11 per cent. per annum on a car costing five hundred dollars. It was admitted that it would be desirable to make a high per diem charge as a greater inducement for the return of foreign cars; but, on the other hand, it was recognized that a high per diem charge would act in the nature of a fine, and would be unjust in many cases where cars are necessarily detained for the legitimate transaction of business. This reasonable objection to a high per diem charge has, no doubt, been one of the causes which has so far prevented the introduction of the per diem system.

The report gives at length the arguments for the combined mileage and per diem system, and continues: It seems to be certain that the plan now in use is the most objectionable that could be devised, and that an effort should be made to secure some improvement. It is believed that all managers recognize the necessity for an improved system, as well as the great difficulties in the way of inaugurating such a system. There are many objections to any plan that may be proposed; but it is believed that the per diem plan, on the general principles above mentioned, would be an improvement on the present plan and benefit all roads, whether they are car borrowers or car lenders, because all roads are interested in and benefited by securing a more efficient use of cars.

Your committee has also taken up the rules for the settlement of interchange of freight car service, as adopted by the Trunk Line Committee, and has carefully considered and discussed them, rule by rule. In connection therewith it has also had before it reports of the practical operation of these rules, which have been in force on a number of roads for several months, and are now in force on 34 roads, covering 22,621 miles of railroad; and your committee unanimously recommends for adoption by the members of the convention the rules now in use by these roads. [The mileage and per diem rules used by the Pennsylvania and other lines, and heretofore published in the *Railroad Gazette*, are here quoted.]

The matters referred to the Time Convention by the Superintendents' Association were discussed by this committee and the following resolutions agreed upon:

Resolved, That the rates per train mile, for any trains using other lines in avoiding wash-outs and other obstructions, be recommended, viz.:

Fifty cents per train mile for either passenger or freight trains handled by their own engine and crew, together with the actual cost of pilotage, and with fuel and incidental supplies, at cost plus ten per cent., and water at 50 cts. per tank.

The Committee deem it expedient to adopt no fixed rule for the cost of engine service.

Resolved, That the per diem for passenger coaches loaned at other than mileage rates, be fixed at \$5 per day, and that where it is necessary to haul to or from the point of delivery, a hauling rate of 5 cts. per mile be added, subject, however, to agreement between the parties interested.

Train trackage and other rates hereinbefore provided, are recommended for use only between roads mutually agreeing

to exchange service on the basis aforesaid. No attempt has been made to fix the cost of trackage or other service, and the prices named above bear no relation thereto, but are named only for temporary use in times of emergency.

The replies to the circular on the question of demurrage varied greatly. A few roads collect a uniform demurrage charge regularly, but in a great majority of cases this is not done. The committee recommends the adoption of the rules adopted by the Superintendents' Association, namely:

- That the charge per diem for delay in loading or unloading freight cars should be 50 cents after 48 hours from the time of delivery of cars on track for loading or unloading, not including Sundays or legal holidays.

- That proper notices be provided in bills of lading, tariffs and expense bills, notifying shippers and consignees of this charge.

- That such charge for delay of cars should not be refunded, except on the recommendation of the superintendent and approval of the general manager.

At the suggestion of Mr. H. Stanley Goodwin, General Superintendent of the Lehigh Valley, the committee issued a circular in reference to the routing of cars. Seventy roads are in favor of a rule prohibiting the loading of foreign cars or the moving of them empty except toward home; 7 want no rule, and 12 are doubtful; but, in regard to prescribing a penalty, only 30 roads were prepared to approve of any penalty whatever. The report is signed by Theodore Voorhees (Chairman), P. P. Wright, S. M. Prevost, F. K. Huger, H. F. Royce, C. H. Platt and G. B. Harris.

The report was received and the Committee continued. The meeting not being ready to act on the questions brought up, deferred action until the fall meeting, instructing the Secretary to immediately send out copies of the report to all railroads in the United States, the responses from such roads to be considered by the Committee and such action taken on them as should be deemed expedient.

The officers of the Convention for the ensuing year are: President, H. S. Haines; First Vice-President, J. M. Toucey, Second Vice-President, D. J. Chase; Secretary, W. F. Allen. Executive Committee: H. B. Stone, Chicago, Burlington & Quincy; C. W. Bradley, West Shore; James McCrea, Pennsylvania; J. W. Thomas, Nashville, Chattanooga & St. Louis; E. T. D. Myers, Richmond, Fredericksburg & Potowmac; John Adams, Fitchburg.

General Superintendent Goodwin of the Lehigh Valley tendered an invitation to the members of the Convention to inspect the working of the train telegraph on the New Jersey division of that road on Thursday afternoon, and the invitation was accepted.

Curtis Damper Regulator.

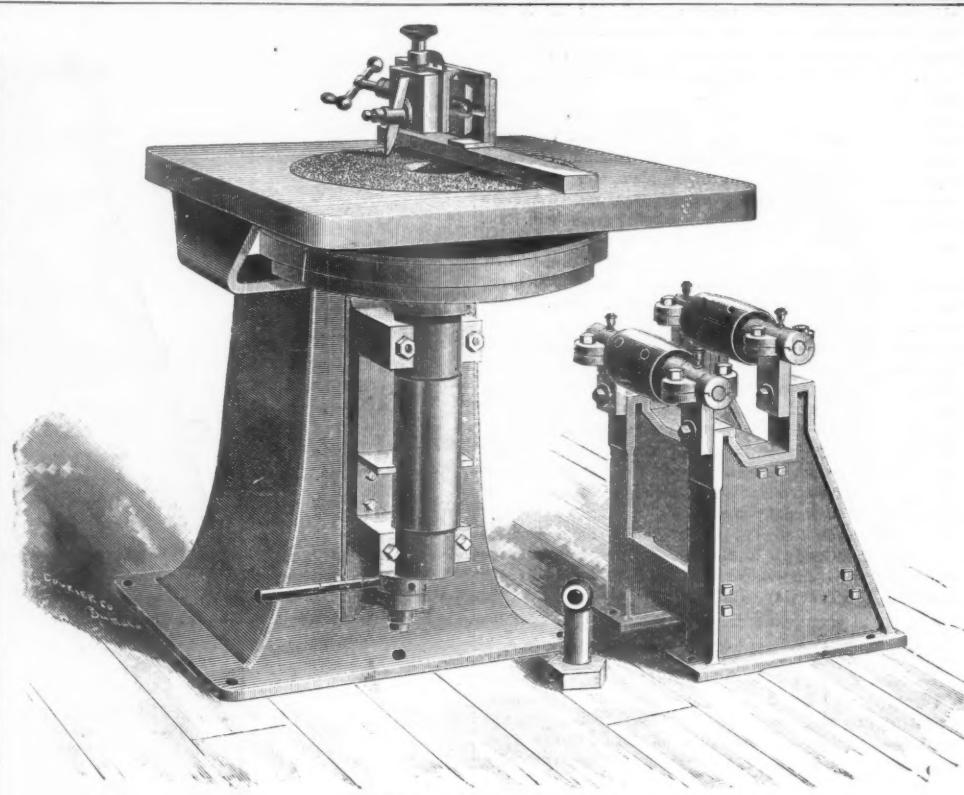
We illustrate on this page an improvement which has been made in the well known Curtis Damper Regulator, manufactured by the Curtis Regulator Co., of Boston.

In this device the principles contained in the Curtis Pressure Regulator have been applied to the movement of a damper in the flue of a steam boiler so as to obtain uniform boiler pressure. It is claimed that many of these devices close and open the damper with a variation of 1 lb. per square inch of boiler pressure.

The full view shows it as attached to a damper and the sectional view shows the operating parts. Steam is brought in a $\frac{1}{4}$ -in. pipe from the boiler to the chamber surrounding the valve *E*. This pressure is also carried through the side pipe *A* to the diaphragm. By turning down on the handle *H* the spring *S* is compressed, loading the diaphragm with any given weight, thus holding the valve *E* to its seat.

When the boiler pressure in the valve chamber rises high enough to lift this load, the valve opens say $\frac{1}{100}$ of an inch, admitting the steam to the top of the piston *P*, pushing it down to the bottom of its stroke, overhauling the chain and closing the damper.

The improvement consists in extending the stem *D* of the



EMERY WHEEL SURFACER.

Made by the SPRINGFIELD GLUE & EMERY WHEEL CO., Springfield, Mass.

follower (which rests on the phosphor bronze diaphragm) up through the handle to such a length that the yoke rests on it when the damper is sufficiently closed and forces the valve *E* to its seat, cutting off the flow of steam into the piston chamber. The piston starting back relieves the pressure on the spindle *D*, permitting the valve *E* to open again, providing just the needful pressure in the cylinder to hold the damper closed until the boiler pressure, falling say $\frac{1}{2}$ lb., has no longer power to open the valve, and the weight opens the damper.

The condensation in the chamber over the piston passing through the adjusting screw *B* is carried away by a small drip pipe into the ash pit.

Another improvement consists in making the piston *P* quite long, a loose fit, and putting in water grooves, which make a tight water packing to a perfectly free piston, which, it is stated, from experience at work has proved to remain unchanged and perfectly effective.

It is claimed that this device is sensitive and is not liable to become inoperative through neglect. While Mr. Curtis does not advocate carelessness, he has endeavored to produce a damper regulator which would work under adverse conditions. As the steam is at the full boiler pressure it has sufficient power to move the damper under all practical difficulties. While so much power is not necessary in the well-kept

boiler room, there are thousands of steam boilers which need regulators, that are located where the dampers are not kept from rusting; for such positions, it is claimed, this damper regulator has no equal.

Emery Surfacing Wheel.

The accompanying engraving shows an emery wheel grinder for surfacing work. This grinder is especially adapted to grind objects that can be held in the hand. In many cases they can be finished in less time than they could be secured to a face plate or angle iron, or put in a chuck.

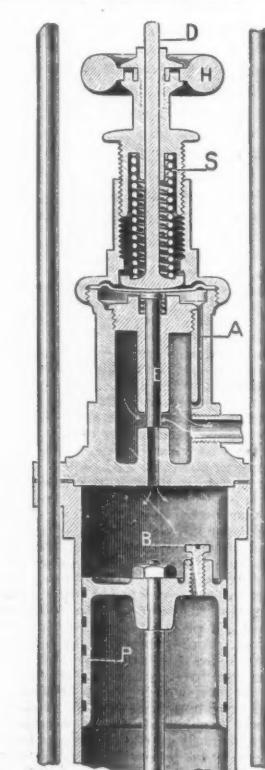
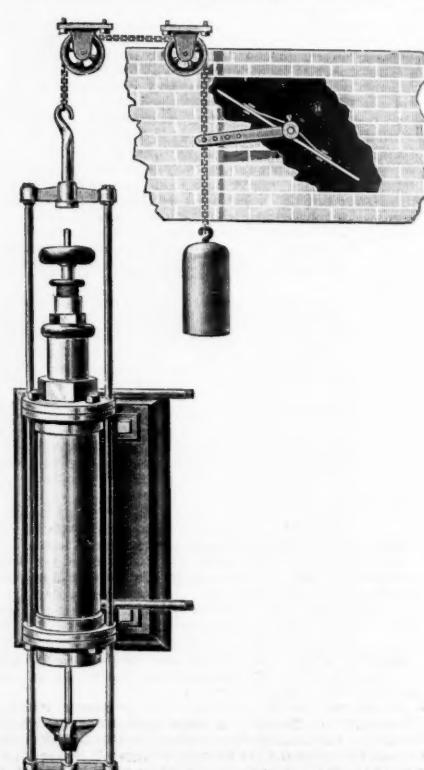
The engraving shows a slide rest set edgewise for using a diamond tool for truing the wheel. It is easily removed when not in use, and the cross-bar it is attached to it is useful in steadyng the work.

The machine stands 38 in. high. The base on the floor is 30 by 26 in., and the table is 30 in. square. The emery wheel is 20 in. diameter, $6\frac{1}{2}$ in. deep, mounted on a $2\frac{1}{2}$ -in. steel spindle that is secured to a gibbed carriage running over dove-tailed track and raised by a screw as the wheel wears away. The surfer is manufactured by the Springfield Glue & Emery Wheel Co., of Springfield, Mass.

Auditors' Meeting.

The Railroad Auditors' meeting held at Washington, March 28, to consider the Inter-state Commerce Commission's proposed form of annual report, is just reported. The changes suggested are summarized as follows: Page 2.—Question 4, "With what other companies consolidated?" changed to "If a consolidated company, what were the constituent companies?" Page 14.—Item, "Shop Machinery and Tools," taken out of "Equipment," and put under "Construction," following "Machine Shops," "Car Shops," etc. Page 16.—Item, "Shop Machinery and Tools," taken out of "Cost of Equipment," and placed under "Cost of Road," following item "Buildings." Page 30.—Items, "Commissions Paid" and "Repayment to Shippers—Overcharges and Other Purposes," stricken out. Columns "Chargeable to Passenger Traffic," "Chargeable to Freight Traffic," stricken out. Page 34.—Items, "Total Balances from Companies and Individuals," "Traffic Balances (net)" taken out of "Other Assets," and placed under "Cash Items." Page 42.—Instead of showing salaries of individual officers, information to be shown under head "General Officers." Item, "Stenographers," stricken out, to be included with clerks. (Section 20 of the Inter-state Commerce law calls for the number of employés, and the salaries paid each class, and the committee thinks that the law will be complied with by stating the officers in one class, as it does not call for the salaries paid each individual.) Page 44.—Item, "Cost of transporting each passenger one mile." "Profit per passenger per mile." "Cost of carrying one ton per mile." "Profit per ton per mile." To be stricken out. Page 46.—Item, "Dressed Beef," changed to "Dressed Meats," to include pork. Pork on next line stricken out. Item to be inserted, "Iron, Pig and Bloom." The forms for pages 10, 12, 18, 22, 28 and 58 are revised and proposed forms printed in full, but we omit them for lack of space. The most important changes in them are in page 22, "commissions" being deducted from passenger receipts, and "over-charges paid" being deducted from both passenger and freight. Car mileage and switching charge balances are placed under miscellaneous receipts.

Auditor McCain explained that the Commission will require a report from every road which derives any propor-



THE CURTIS DAMPER REGULATOR.

Made by the CURTIS REGULATOR CO., of Boston, Mass.

tion of its revenue from inter-state traffic, regardless of whether the road extends from one state to another, or is located wholly within one state. Leased roads need only furnish financial exhibits of their business as corporations; their traffic operations to be included in the reports made by lessees of such roads. A road doing inter-state business is required to make a report covering its entire operations, covering inter-state as well as intra-state. June 30 is the date fixed by the Commission for closing fiscal year, and the first report required from railroads will be for the year ending June 30, 1888.

The sense of the meeting was that the information on page 46 is useless, as a uniform classification cannot be prepared for all sections of the country. State Commissioners have found these statistics useless, because nearly every shipment gets reported on two or more roads, the value of the summaries being thus destroyed.

Resolutions were passed looking to a combined effort to induce the several states to adopt the inter-state form of report, and June 30 as the end of the year to be covered. The Chicago committee was continued, and a committee of 15, with M. M. Kirkman as Chairman, was constituted for the purpose of forming a permanent national organization. About 60 roads, covering 72,000 miles, were represented at the meeting.

The Strikes.

The *Journal*, the organ of the Brotherhood of Locomotive Engineers, has, in its April number, an editorial on the strike which we suppose may be taken as an expression of the calm views of the general officers of the Brotherhood. The article refers to causes of this strike which it is said existed years ago. The consent given by the Grand Chief in the present case was not founded on the wrongs of a day or a week, but on account of years of injustice. Forbearance ceased to be a virtue years ago. A committee of seven engineers went to Chicago to see the General Manager and found him absent, but were told by the Superintendent that their case should receive attention, and that their interests should not be jeopardized. Three days after the Committee returned home, four of the seven were dismissed. "They were discharged from the road that they had served faithfully for years for simply acting in the capacity of a committee." When this happened is not stated. Time passed on and the Brotherhood became strong and successfully adjusted many differences on this as well as other roads. Vice-President Potter satisfactorily settled certain grievances a year ago, and the *Journal* praises his conduct generally. "Unfortunately, perhaps, for the employés, Mr. Potter was called to the Union Pacific, and when Mr. Stone took his place the agreement which had been respected for the previous year was of but little value in his eyes." The first difficulty with Mr. Stone was that he refused to negotiate except for the C., B. & Q. proper, thus necessitating a visit by the grievance committees to each of the four or five general managers in the Burlington system. An appeal was telegraphed to President Perkins, which, after waiting some days and sending a second telegram, was responded to by the information that Mr. Stone had authority to act for the President. Efforts with the General Manager continued unavailing, however, and Messrs. Arthur and Sargent were called in; "but from the very outset it was evident that Mr. Stone was determined to have his own way in everything, without any regard to the wishes of his men or what was paid by other roads, let the consequences be what they might." The article reiterates the statement that 90 per cent. of the roads in the United States pay the rates which the Brotherhood demands of the Burlington. It goes on:

The main question was not reached in the discussion, for the reason that when minor points were discussed and objections were raised by Mr. Stone, who would state what he considered to be fair in the premises, and when the Grand Chief would accept the proposition in behalf of the men, he, Stone, would then abandon his own proposition and say he was not ready to adopt it; thus giving positive evidence that it was his settled purpose to bring about a conflict with the hope of destroying the Brotherhood upon his road.

It is stated that the new men now on the road would not, as a rule, be permitted to wipe engines when no trouble existed. Many of the men are well-known engineers (one is named), who have been repeatedly discharged for drunkenness.

Chicago dispatches of April 5 stated that the situation remained quiet. Freight was moving freely to and from all the roads, and the Burlington appeared not to be embarrassed. There were rumors concerning the influence of the Knights of Labor over various grades of employés of the Burlington, and reports that the brakemen would be induced to strike, but there seems to have been little or no ground for the assertions made. The road discharged its Pinkerton guards and depended upon the regular city police. A night switchman in the employ of the Chicago & Northwestern was arrested for threatening to shoot a Pinkerton watchman. Dispatches state that the Burlington road has the sympathy of the best class of business men. The great body of strikers are said to be peaceful, very few combining with the lawless element to make trouble wherever there is a crowd. Figures are published showing that there is a fair amount of freight traffic in and out of Chicago over the Burlington road.

On Monday of this week a Burlington engine was fired upon when coming from the yard of the Chicago & Western Indiana. At Forty-seventh street a large crowd of strikers, sympathizers and ruffians was gathered, and as the engine approached stones were thrown. A man in the cab was hurt and immediately fired his revolver into the crowd, wounding one man. A rush was made for the engine, but

the men on it defended themselves with their revolvers and escaped. Further on a similar attack was made, and the men on the engine fired, wounding another man, it is said fatally. Further derailments of yard engines were reported on Wednesday. A man was arrested for getting on the front of a baggage car of a passenger train and closing the air-brake valve. He was held in \$2,500 bonds.

Rules of Interchange of Freight Cars.

The following instructions to inspectors at points of interchange of traffic were adopted April 1, 1888, for traffic interchanged by the undermentioned companies: Fitchburg, Delaware & Hudson, New York, Lake Erie & Western, Delaware, Lackawanne & Western, New York, Pennsylvania & Ohio, and Chicago & Atlantic.

These instructions do not conflict with M. C. B. rules of interchange, but are agreed to in detail to facilitate the interchange of traffic conducted between these companies.

CARS WILL BE RECEIVED WITH

Trussed truck bolsters showing a crack across section not more than three inches measured vertically.

Draw springs with one break in outside coil.

Draw-bars that can be pulled out by hand, not to exceed two inches.

Draw-bars cracked through pin hole—top or bottom only.

Draw-bars with crack in one side, lengthwise of head.

Solid forged draw-bars with one side of face broken.

Wrought draw-bars with face plate with tenon broken on one side, provided there is bolt or rivet through plates back of pin hole.

Draw sills properly reinforced.

Draw timbers with one bolt broken.

Brake wheels with one cracked spoke when there are six spokes in wheel.

Corner castings cracked.

Centre castings cracked when centre pin passes through truck and body bolsters.

One body bolster truss rod broken.

Door handles broken or gone.

Column castings cracked.

Column castings guides cracked.

Oil box springs with one break.

Bolster springs with one coil broken if body and truck will not interfere in transit.

CARS WILL NOT BE RECEIVED WITH

Running boards in bad order.

Brake step split through bolt holes at outer edge.

Roof grab irons, ladder rounds, ladder handles and sill steps defective or missing.

Brakes inoperative, except when long timber extends over two cars, in which case one brake to both cars will be considered sufficient.

Dead blocks missing.

Door hangers broken or missing.

Door slides broken or missing.

Ordinary Wear.

Defects named below may be caused by ordinary wear, and owners should receive cars with these defects when there is no evidence of rough usage.

1. Brake shoes worn out.

2. Pedestals cracked.

3. Centre plates cracked or broken.

4. Column castings and guides cracked.

5. Bolsters and spring planks broken.

6. Truss rods on trucks and body broken.

7. Bolster and journal box springs broken.

8. Trucks spread.

9. Loose dead blocks.

10. Loose sheathing on side of car.

11. Loose tin or board roof.

12. Ends of car bulged out.

Wrong Material.

The carding of cars repaired with wrong material as called for by the M. C. B. Rules of Interchange will be insisted on, but this will not operate to detain cars already running and repaired with any material, provided the car will run properly.

Automatic Control of Heat.

At the meeting of the New England Railroad Club, March 11, Mr. W. C. Temple, of the National Electric Service Co., showed the automatic regulator of that company, and we give below an abstract of a paper read by him on the occasion:

In the start the various railroads as well as the companies who warm the cars by steam will see to it that the care of their appliance is placed in the hands of intelligent men, and will have reports prepared in such a way that they can have some knowledge of the working of their heating systems; but as steam heating becomes general on the road the expense of maintaining a corps of men for this purpose will be too great to be borne or even considered for a moment by either the railroads or steam heating companies.

Then will be the time, even more than now, when the apparatus presented by us for your attention to-night will become an absolute necessity. We can attach our appliance to any form or any system of steam heating or in fact any other kind of heating ever devised, and we are not tied in any way to any one of them. All of the tables of temperatures and experiment which we have in our possession and will submit to you, are based upon the system of steam heating used now entirely by the Chicago, Milwaukee & St. Paul road, for the very good reason that those cars are the only ones to which we have ever attached our appliance.

We have had cars running on that road throughout the entire winter, where the mercury has varied from 40 degrees below zero to 40 degrees or 50 degrees above, and yet the maximum variation of temperature in the cars controlled by our appliance has been 4 degrees, the runs generally averaging an extreme variation of about two degrees from Chicago to St. Paul; the runs being frequently made without any reported variation whatever. For instance, train No. 1 on the La Crosse division of the St. Paul road on Jan. 12 started at 7:30 p. m. with an external temperature of 30 degrees above zero, the thermometer in car 296 (regulated by our system), indicating exactly 70 degrees. The temperature of that car was taken at 9:00, 10:00 and 11:00 p. m., 1:00, 2:00, 4:00, 6:00, 8:00, 10:00 and 12:00 a. m., 2:00 and 4:00 p. m., and in each instance it was exactly 70 degrees, there being absolutely no variation reported during that entire run, occupying almost 24 hours. In the meantime the external temperature varied from 30 degrees above zero, at 7:30 p. m., to 10 degrees below zero at 8 the next morning, there being on that one run a variation in external temperature of 40 degrees. There

was no difficulty whatever in keeping the train warmed to 70 degrees in the coldest part of the run, the trainmen reporting that, notwithstanding the severity of the weather, they found the thermostatic valves closed fully one-half or two-thirds of the time. One of the cars on the St. Paul road equipped by us has traveled a distance more than equaling twice the circumference of this earth without the apparatus receiving any care or attention from us whatever, and the difference between the highest and lowest temperature observed in that car at any time through this long period has been 4 degrees.

Another improvement designed by us for use in our heating is the electric trap. This trap remains absolutely shut on an average about $\frac{2}{3}$ of the time. In weather colder than 20 degrees above zero it is not open more than a minute at any one time. The water of condensation passes out from a hole about $\frac{1}{4}$ of an in. in diameter with a rush. The moment the steam strikes it the trap closes absolutely tight; there is therefore no waste of steam. There is no drizzling of the water, as is the case with expansion traps, which are apt to freeze up from this cause. It needs no adjustment or attention whatever, and works exactly the same whether it is 30 degrees below zero or 90 degrees above. This trap is simple and certain in its action, and has beside the virtue of perfect operation and workmanship, the additional charm of instantly opening wide and allowing a free $\frac{1}{4}$ in. passage from the steam pipes in the car to the open air the instant the car is disconnected from the train, making it impossible for any water of condensation to be left in the pipes to freeze when the cars are disconnected and left standing in the yards.

By the use of this apparatus the great danger heretofore existing of contracting colds, pleurisy and often pneumonia in railroad travel is almost entirely dissipated. Physicians tell us that in ordinary winter apparel the human body breaks into a profuse perspiration ordinarily at a temperature of 75 degrees, or slightly above. In at least three cases out of five of pneumonia it is contracted by a person going from a warm room with the pores wide open into the cold outer air, and experiencing the sudden chill and closing of the pores that naturally follows. In railroad trains this is particularly apt to happen, for the reason that the stops are frequent, and almost the instant a stop is made the doors at each end of the car are thrown open, and a sudden draft of cold air rushes through the car. So long as the temperature of the car is at a proper point, say from 68 to 72 degrees, this draft, unless continued for some time, will have no particularly ill effect, but let the car be from 75 degrees to (as we have found it on several occasions) 90 degrees, and the effect on the health of women, invalids and even strong men in the prime of life and full health can be better imagined than described, so that taking it for granted (as you will) that to sit in a room having a uniform temperature is a great comfort, we prove the three cardinal claims made for this appliance in the order that we deem most important, that is, health, comfort and economy; and economy in train heating means much more than it does in buildings, for the reason that there is not only the dollars and cents value of the coal which is to be considered, but the capacity of the locomotive is proportionately increased, the carriage to and fro of the extra amount of coal necessary to warm the cars is proportionately decreased, for the statements of numerous inventors to the contrary notwithstanding, a thinking mechanic cannot bring himself to believe that a locomotive can pull as heavy a load as was before rated its capacity, and at the same time warm a train of ten or twelve cars, and do all this work with less fuel than was originally required to pull the cars alone.

Below are given two tables of observed temperature on trains of the Chicago, Milwaukee & St. Paul, Chicago, La Crosse & River Division. They are from official reports to the mechanical engineer.

TRAIN NO. 1, JAN. 6, 1888.

Time.	Car 234.		Car 335.		Engine.	Outside.	
	Pres.	Tem.	Pres.	Tem.			
10 p. m.	5	72	5	70	687	10	30 above.
12 "	8	70	6	70			20
1 a. m.	12	72	6	70	692	15	10
3 "	12	70	10	70			8
5 "	8	72	6	70	365	20	Zero.
7 "	10	70	8	70			4
9 "	8	64	6	70			5
11 "	12	70	10	70			5 below.

*Hand regulation 8° variation.

†Johnson regulation 0° variation.

‡Variations of external temperature 35 degrees.

TRAIN NO. 1, JAN. 12, 1888.

Time.	Car 296.		Car 346.		Engine.	Outside.	
	Pres.	Tem.	Pres.	Tem.			
7:30 p. m. . .	12	70	10	72	723	15	30° above.
9:00	15	70	12	70			" "
10:00	14	70	16	70			" "
11:00	4	70	10	70	705	15	28° "
1:00 a. m. . .	8	70	8	70			" "
2:00	6	70	12	74	693	18	8° "
6:00	5	70	10	70			4° below.
8:00	4	70	12	70			" "
10:00	8	70	15	70	367	18	10° "
12:00 m. . . .	12	70	10	72			" "
2:00 p. m. . .	8	70	12	70			" "
4:00	2	70	0	68			" "

*Johnson regulation. Extreme variation, 0°.

†Hand regulation. Extreme variation, 6°.

‡Variations of external temperature 40°.

American Tool Steel in Europe.

Some months ago we had occasion to make some comment on an article which appeared in the *Ironmonger*, of London, concerning the introduction by Park Brothers, of Pittsburgh, of their tool steel into European markets. That journal in the article referred to was rather skeptical of the success of the American manufacturers, but in its issue of March 17 it announces that Bagshaw Brothers, of London, Paris and Brussels, are acting as agents for Park Brothers, and that the arrival of shipments of steel made by natural gas is now a confirmed fact. It is added that, "if it be true that the process of making steel by means of natural gas gives purity of flame and unexampled regularity of heat, which no other kind of fuel can supply, this is perhaps a rat's her serious handicap for the British producer." It might be well to say that Park Brothers won their enviable reputation for good tool steel some time before they adopted the use of natural gas, and that the excellence of their products would probably not be impaired by the failure of the gas wells around Pittsburgh, although the use of natural gas has, no doubt, favorably affected the cost of their steel.



PUBLISHED EVERY FRIDAY,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The Superintendent's Association has again suffered from slim attendance, its meetings this week being almost fruitless in the way of discussion. Those members who attended came to New York also for the purpose of attending the Time Convention, so that they doubtless regard their time as by no means wasted; and the informal meeting of railroad men outside the convention pays for the journey in most cases. Nevertheless, the regular meetings could be made more profitable, even without an increase of active members, if members made the appointment positive and exact. With a meeting convened promptly at a well-understood hour, and treated by each member as his first business, profitable interchange of thought could be had; but with the hour indefinite or the meeting made secondary to other appointments, the result can be easily predicted. The report of the roadway committee is a document of a good deal of interest, as it embodies the opinions, on a great variety of subjects, of some forty-four officers who replied to the circular of the committee. It is not the most satisfactory sort of report, for the replies are merely collected and summarized, with no attempt on the part of the committee to pass upon them. In but one case does the committee draw a conclusion from the replies received. That is on the question of accidents from spread rails. It is unfortunate that those who assembled at the convention did not take time to discuss this report at length.

The Time Convention disposed of its business in short order. The excellent suggestion of the Executive Committee in regard to the permanent committee on train rules was adopted, and a committee appointed, but no work was given to it. The committee on per diem car service, demurrage, etc., made an important report, but influential roads were not ready to act upon it, and the matter was therefore put over to the next meeting. The roads which are using the per diem system seem not yet prepared to urge it with enthusiasm upon the others. Until statistics, giving a clear exhibit of results thus far attained, can be digested in committee and placed before the Convention it is perhaps as well not to attempt final action. The conviction that demurrage must be enforced as an auxiliary to the use of the per diem charge in interchange seems to be growing, a few roads having already adopted stringent measures with their consignees. The Superintendents' Association has reason to be satisfied with the recognition it has received. The Car Accountants have already secured the confidence of the Time Convention, and the relations of the latter to the Master Car-Builders' Association will very likely depend largely upon what sort of instruction each Master Car-Builder shall receive from his own General Manager before the next meeting, the Master Car-Builders' Association

having as yet taken no action looking towards an interchange of ideas with the Time Convention as a body.

On another page will be found a communication in which the theory of the sloping rail head is carried out to its proper conclusion. Mr. Millholland's experience has convinced him that he gets better wear out of the wheel, and easier hauling as well, when the flange and rail head are so shaped as to fit each other closely. He has found that his rails, where worn by flanges, are worn to a side slope of 20 degrees with the vertical. Therefore, to be perfectly logical, he has designed a rail with that slope, and a flange to fit it exactly. We shall be interested to know the results of actual experience with this rail and flange. If Mr. Millholland's observations have been accurate and correctly reasoned from the results on his own road must be an increased life of rail and wheel and economy of fuel. But the conditions on the George's Creek & Cumberland Railroad are peculiar. The loaded trains run one way, and much of that down grade; an extraordinary percentage of the line is on curves; the curves are unusually sharp, and the locomotive equipment is evidently mostly Consolidation engines. In 1886 the passenger-train mileage was 30,868 miles, freight 88,784 miles, and the total ton-miles were about 11 million. The road had six locomotives. The road operated (exclusive of trackage rights) was about 20 miles. While the operations of the road are important enough to make conclusions drawn from them valuable, the conditions are such that they may not be generally applicable. There is one explanation of the decreased wear of engine flanges and the decreased train resistance, observed by Mr. Millholland, which is so obvious that it has undoubtedly been considered by him, and for satisfactory reasons set aside; that is, the effect of the wear was to change the relative proportions of the gauge and the rigid wheel base of the Consolidation locomotives. It is conceivable that the wear should diminish as the surfaces in contact are increased, but that the train resistance should also decrease as a result of the larger wearing surface is hard to believe. We shall return to this subject in a later issue.

The rate war west of Chicago seems to be settled—for a while. The Chicago, Burlington & Northern has restored its rates and holds in abeyance its demand that a radical change be made in the basis on which rates between St. Paul and the seaboard, via Chicago, shall be made. The Chicago, Burlington & Quincy has restored all rates except those on grain, which it will advance April 15, claiming this postponement is necessary to do justice to shippers whose calculations have been interfered with by the switchmen's strike. The Sault Ste. Marie line has agreed to keep its rates on a level with those of the lowest route via Chicago (the Grand Trunk). But the motives for this outward cessation of strife are not explained, and the question of the differences about the causes of the original cutting, which certain roads said they should insist upon having settled seems as far from solution as ever. The new lines still exist and still desire traffic as much as ever. The Burlington is not probably going to run its northwestern line for the pleasure of the thing any more than in the past. As a rule, heretofore, new lines have fought until they were either recognized or bought out or killed, and there is no indication that the situation in the west is any different now. With two or three new lines to Kansas City which cannot keep soul and body together without a share of the traffic which the older lines have enjoyed; with the same number to St. Paul, in about the same situation, and the Sault Ste. Marie and Canadian Pacific combination striving to get a share of the business of a half dozen lines east of Chicago as well as of those west of them, it is quite safe to agree with those people who believe that the present peace will be shortlived. There is simply a concert of action in deciding to try and earn a little money while laying the plans for the next struggle. It is said that the "Soo" line will bid for through passenger traffic June 1.

Steel appears to be gradually superseding iron in all directions, and since steel rails were found far superior to those made of iron, the progress of the better material has not met with a single decided check. Steel plates, bars and angles will soon be used in bridges, ships, boilers and structural iron-work generally, to the exclusion of iron. Cast steel in like manner is superseding, not only iron castings, but iron forgings and many forms which are expensive and difficult to make in wrought iron, are made with greater ease and strength in cast steel. Until lately it had been thought that good wrought iron owing to

its welding properties, would continue to be used for smiths' purposes. But even there, it seems probable that it will be superseded by mild steel. It might be thought that the latter metal would not weld, would be more liable to be burnt by overheating, and would be injured by being worked at the low or dangerous blue heat of steel. But apparently these difficulties can be overcome. A firm who have added Bessemer converters to their original iron making plant, lately sent out a large number of steel bars and rods for smiths' use. These bars were supplied to customers who had formerly used the wrought-iron bars made by this firm. The users have, however, made no complaint, and apparently found that the steel could be as readily worked and welded as the iron formerly supplied. This certainly promises a further field for the use of steel. Weldless, solid drawn steel tubes have been used to a limited extent, but have been found to stand vibration better than copper tubes or iron pipe. Welded steel pipe has been lately introduced, with, it is said, considerable success. Other fresh uses for steel have been lately recorded in these columns and solid cast-steel car wheels threaten to compete with the long established chilled wheel, while it seems probable that solid cast-steel guns will not only prove infinitely stronger and more durable than those made of cast iron, but will be far cheaper and quite as serviceable as built-up guns, with an inner steel tube surrounded by wrought-iron jackets. The use of a heavy percentage of manganese with steel also yields a valuable material of great strength and hardness, and further develops the fact that iron is improved in strength by the addition of small proportions of other elements besides carbon. The use of chrome steel has further developed, and a cheap and very efficient spring steel made by the Siemens Martin process is now used with great success in railroad work, this steel containing an admixture of chrome.

Within the last two weeks there has been a number of train accidents due to high water. Embankments and structures have been washed away in many parts of the country; but in most instances the danger has been discovered in time to prevent accident to trains, and when it has not the loss of life has not been great, except in one instance. A passenger train on the Chicago, Milwaukee & St. Paul was precipitated into a swollen stream near New Hampton, Iowa, about 2 a.m., on April 5, and nine passengers were killed, several probably being drowned, while about twenty-five were injured. The water had risen quite suddenly, and some accounts say that a gorged of ice had carried the bridge out of line, while others state that ice had been left on the track and derailed the train before it reached the bridge. If the same number of deaths and injuries had resulted from a car-stove fire or from a poor wheel, a broken rail or the carelessness of an engineer, severe censure of the road would be heard on all sides; and the absence of criticism in cases of this kind must be regarded as indicating a general sentiment that casualties under circumstances of this sort are unavoidable. Damage by flood is looked upon as a visitation of Providence, which cannot be escaped. To a great degree this lenient attitude of the public mind is just.

To the engineer on construction floods bring most difficult problems and each case must stand by itself. The general lessons which each season of high water enforces teach anew the need of adequate water way and good foundations, and the care that should be used to protect banks and side hill cuttings, but the impracticability of making all water passages on any given road of sufficient capacity for the greatest possible flood volume is obvious, still it may be doubted if general practice gives the greatest practicable safety. Concerning this we shall have more to say in a later issue.

The operating officer has, however, to get his trains safely over the track as the engineer has left it, and it is for him to consider what extra precautions should be taken in time of freshets. Two, at once suggest themselves: trains may be run slower, and the road may be more thoroughly patrolled. In our opinion both of these precautions should be more freely employed than they are, not only after storms but in times of extraordinary droughts. After the Chatworth disaster the daily press caught up the idea of track patrol and made much of it, but little or nothing was said about the speed of trains in times of unusual danger. It is generally true that railroad officers would be glad to reduce speed if the public demands and the exigencies of competition permitted it, and it is probably true that those who travel will ordinarily take some risk rather than miss a connection or come in behind time. The general impatience of the modern man to get somewhere is too well recognized to need

any proof. But is it not the duty of the railroads to educate the public in this direction, and, regardless of public convenience or public requirements, to run slowly in times and places where there is good reason to suspect unusual danger? This is one of the most obvious lessons of many of the accidents of the last year. Fast trains, which make schedule time under all circumstances, are popular and attract business, and enterprising railroading brings glory as well as profit when it succeeds; but at the risk of becoming tiresome we will repeat what we have so often said, that enterprising railroading to be good railroading must be enterprising all around. If fast schedules are made, and trains kept to them, all reasonable precaution must be taken to make them safe.

Steel Fireboxes and Water Purification.

The present high price of copper seems likely to lead to fresh experiments with steel as a material for locomotive fire-boxes in England and elsewhere. It is estimated that at present prices the substitution of steel for copper would effect a saving of \$800 per locomotive. It is pretty generally acknowledged that the successful use of steel for fire-boxes depends largely upon certain conditions. The quantity of carbonates and sulphates of lime and magnesia in the water must be small, the plates must be thin, and the steel must be mild and contain the maximum quantity of phosphorus. If all these conditions are complied with, experience here goes to prove that the duration of the fire-box will probably fully equal that of any part of the engine. Steel fire-boxes hitherto tried in Great Britain have proved short-lived, owing to the fact that on all the three points above enumerated the conditions were unfavorable. The lines on which steel fire-boxes were tried—the London & Northwestern, the North London, Great Eastern and Brighton—all happen to run through chalky districts, where the water is very hard and contains a great deal of lime. Many years ago, when the manufacture of steel was in a transition state, some "homogeneous steel" fire-boxes were made for a Scotch line, the Caledonian, and gave good results, probably because the granite and slate formation through which that line runs yield good soft water containing little or no lime. The high price of steel at that time, and the difficulty of securing a further supply made under the same peculiar process, led that line to revert to copper, and the poor results obtained with steel on English lines sufficiently explain their continued adherence to copper. Had the influence of hard water been as well understood a few years ago as it is now, it is probable that the rest of the world would have followed our example in using steel fire-boxes.

The exact nature of the causes which render steel fire-boxes short lived where hard water is used are not very clear, but it is generally believed that the lime forms a hard incrustation, which being a bad conductor of heat, allows the plate to be overheated and unduly expanded. The subsequent contraction when the plate is cold causes cracks in plates which are too hard and brittle and contain even a minute quantity of phosphorus. It seems probable that the cracks are caused by the plates being strained when subjected to a blue heat. It is now well understood that steel will crack when cold if it has been previously worked at a blue heat, and probably this fact, then scarcely appreciated, explains many of the early failures of steel fire boxes. The steel may very possibly have been strained when at a blue heat and consequently cracked when cold.

The use of steel almost absolutely free from phosphorus has, however, wonderfully lessened the number of unexpected and sudden failures of locomotive fire-boxes, and their gradual deterioration appears to be largely dependent upon the quality of the water. This has been the experience on both sides of the Atlantic, steel fire-boxes having had a long life on lines running through granite or other igneous rocks where the water is soft, and having a short life where using water from sedimentary formations containing a large amount of lime.

As the largest area and most fertile land is found to exist under the latter conditions, it is evident that an increasing majority of our locomotives are using water which throws down the hard scale so destructive to boilers. The question of water purification or softening has therefore attracted much attention of late years, and it seems probable that, on the majority of railroads north of the Ohio and west of the Alleghenies, the water supply at all important points will be artificially softened and purified before being used in the locomotives.

The deposit of hard scale not only shortens the life of a fire-box but materially reduces the annual mileage of the locomotive, the time spent in being washed

out being a loss of time which might be utilized in doing useful work. This is being better understood, and the necessity of analyzing the water supply and using only that best fitted for locomotive purposes, is being very generally practiced by the testing department and laboratory, which now forms an essential part of the equipment of a first-rate railroad.

In some cases tests indicate what water to use and what to avoid, but in many instances it can be clearly proved that none of the available sources of supply are suitable, and that purification is essential even with the best available water. There are however, many cheap and simple processes which will materially improve most varieties of bad water, and will render many kinds sufficiently pure to make an enormous improvement in the nature and amount of the scale deposited.

Most of these processes are based on the Porter-Clark method of softening water. An important portion of the incrusting matter is thus thrown down, but the practical difficulties begin when it is attempted to filter the water from the lime which is chemically separated, but is still held in mechanical solution. It is easy enough to catch the sediment in filters composed of many woven substances, but the difficulty of cleaning these filtering substances so that they can be used again, is not easily overcome, especially as the means of cleansing adopted must deal with a large body of water at a very low cost. Many experiments are now being tried on this point, and the results will be awaited with considerable interest, as the purification of the water supply appears, especially in the West, to be one of the most hopeful directions in which to effect an economy in locomotive expenses.

Co-Operation between Railroads and Shippers.

It is gratifying to know that merchants who desire to see transportation as well as other business conducted on principles of common honesty are in sympathy with the movement to secure a law which shall punish tricky shippers as readily as it does railroad men. The chambers of commerce and other trade associations of our large cities are taking positive action in the matter. The resolutions sent to Senator Cullom by the Window Glass Association of New City will serve as a specimen. They declare that such amendments to the Inter-state Commerce law should be passed by Congress as are necessary to stop misrepresentations of the character and weight of goods, and that will apply like and equal obligations and penalties to both railroads and shippers.

Mr. T. L. Greene, in transmitting these resolutions to Senator Cullom, alludes to the old and knotty problem concerning what is to be done where sections of country compete with certain others. For instance, Birmingham and Pittsburgh desire to sell iron in Chicago. If the former city complains of the rates on the Louisville & Nashville, which has no interest in Pittsburgh traffic, what will the Commission do about it? The self-interest of the road should operate as a safe-guard, but all know that exceptional cases arise where a higher tribunal than a narrow or prejudiced general freight agent is demanded. Mr. Greene suggests as a partial remedy the adoption of a plan to bring the public (shippers) into closer relations with the railroads; to try and prevent rather than cure the evils that shippers complain of. He thinks the feasibility of some plan to have representatives of the merchants sit with the railroad traffic men in their rate and classification meetings ought to be considered.

This plan has not been without advocates among the railroad men themselves. Col. H. S. Haines, of the Savannah, Florida & Western, has been specially prominent in its support. It has a great deal in its favor. To the railroad managers it would give most valuable information, which would enable them to develop traffic on broad lines of public policy, rather than as a special concession to a few personal interests. To the community, it would be, as Mr. Greene suggests, one more means of securing publicity which all recognize as one of the most effective remedies for some of our present railroad evils. An illustrative instance of the way the present practice works is found in the recent action of the Trunk lines and their connections in changing the classification of furniture frames. The Official Classification was altered and the rate on goods of this description increased about 40 per cent. on March 1. Chicago manufacturers who ship east at once made loud complaint, and now we hear that the old rates are restored, the experiment appearing, therefore, to have been worse than useless.

The strongest argument in favor of this plan is that it has been systematically carried out in Germany with good results. Each district has its advisory board, consisting of representatives of different in-

terests. Changes in classification and rates are made by the authorities in co-operation with this board and its sub-committees. Its functions are purely advisory; but its influence is in reality very great, and on the whole most salutary.

We must not shut our eyes to one or two difficulties in the way of any such plan. In the first place, it would be hard to say who should act as representatives of the shippers. In Germany, where the leading business men have an established and often a quasi-official position, there is comparatively little trouble in this respect. In cities like New York, with well established chambers of commerce or associations of producers and traders, there would perhaps be no great difficulty. But in less organized and more unstable communities, where it is nearly impossible to say who should be regarded as the representative of the shippers, the success of the idea in practice cannot be predicted. There certainly could be no just law to restrain railroad men from holding conferences by themselves whenever they saw fit, and some one would have to decide at what stage of a scheme for reorganization of a tariff the public's representative should be called in. The Germans try to bring the advisory boards into action at as early a stage as possible; but their system would be regarded by our railroad men and many of our shippers as intolerably slow.

It has been suggested that the Inter-state Commerce law now requires the roads to give ten days' notice of an increase in prices; that this, in principle, is just what Mr. Greene wants; and that if this were applied to all changes and if the time were lengthened to allow of a hearing, perhaps his object would be attained. We cannot take this view of the matter. Any such compulsory lengthening of the time for changes would cause inconvenience without really giving a chance for full discussion. What is principally wanted in this matter is a fair interchange of ideas. In order to have this freedom of speech we must avoid hampering freedom of action. Nor would it, in our opinion, be possible for the Commission to take cognizance of all the matters which a local advisory board ought to suggest. We do not undervalue the work which the Commission has done in promoting a friendly interchange of views of this kind. We regard it as of the very highest importance; but we hope to see the system extended far beyond the limits of the immediate personal supervision of the Commissioners. Where the shippers show a desire to co-operate in this matter the railroad men certainly ought to meet them half way. If both sides are really in earnest we are confident that some method will be found for meeting the difficulties to which any new plan of this kind is liable.

The Wages Element in the Strike.

The circular which the grievance committee of the Burlington engineers issued to the public on March 17 gives some comparisons of the wages on different roads in the West which shed some further light on the real issue between the road and the men. Taken in connection with the figures found in the general managers' letter (see *Railroad Gazette* of March 9) they tend strongly to show that the average pay of experienced men on the Burlington was not so large as that of the same grades on various other roads, and therefore that the road's profession of willingness to pay as high as their neighbors was insincere. We summarize the important points as follows. (Other points in this circular were referred to in our issue of March 30.)

On the Burlington road, round trip passenger run, Rockford and Aurora, 26 times a month, engineer receives \$104. On Chicago & Northwestern, round trip, Rockford to Chicago, 22 miles longer, engineer receives \$175. The last mentioned runner takes no care of his engine, while the other has to act as hostler. For runs of 100 miles on the Union Pacific passenger runners receive \$3.85. The Burlington men on parallel lines demand only \$3.50. The Rockford way freight on the Burlington is run by a first-year man, who runs 26 nights in a month for \$36; his fireman receives \$35. On the Burlington fast mail the engineer receives for 2 days, 125 miles per day, \$97.50 (3c. per mile). The Northwestern pays for the same work \$120. From Galesburg to Peoria and return, 105 miles, the rate is \$3.60 (freight). The Chicago, St. Louis & Pittsburgh for a 105-mile straight-away trip pays \$4.25. On the Burlington main line \$131 is paid for 125 miles per day, 35 days per month [3c. per mile, equal to \$97.31 per month of 26 days. According to the general managers' circular this must be a passenger run.] The "Trunk lines" out of Chicago for the same service pay \$161 (3.68 cts. per mile, equal to \$119.60 per month of 26 days). Between Galesburg and Quincy, 100 miles, the Rock Island pays all its passenger runners \$3.60. The Burlington pays \$3.50, but only for the heaviest trains; on others the pay is \$3.87. For the round trip between Chicago and Aurora, 77 miles, the rate is \$3.85 (passenger); runners have to make a trip every week day, and act as

hostler. On the Chicago, Milwaukee & St. Paul, between Chicago and Elgin, the round trip of 74 miles is paid \$3.70; the runner does not have to act as hostler, and has every other day to himself, running two trips on the days that he works. The request that the runners of the Galesburg Division be not required to run east of Aurora was made because a number of the men have families and homes at Aurora. The engines are now run through between Chicago and Galesburg, and the men have to go with them. It is claimed that the men could change off at Aurora, and the road still retain the economy of running engines through. The request in regard to passing Brotherhood men was made simply to secure a uniform rule, the question having heretofore been so unsettled that frequent disputes with conductors occurred.

It is evident, however, that the engineers' statement, like that of the managers, is intended to give a one-sided view, and it is therefore impossible to judge of the exact merits of the case. Assuming that the road is fairly satisfied with its new men, these figures are now of no special public value, except as bearing on the subject of wages in general; but the engineers and their friends having complained at our "unjust" stand, we make this exhibit to show the difficulty of getting at the true facts. We have asked for further information, but as yet get no satisfactory response.

In speaking of the Rockford-Aurora run, the exact distance is not given; the *Official Guide's* figures seem to disagree with the statement of the circular. It is stated that the Union Pacific pays \$3.85 per 100 miles, and reference is made to the parallel lines of the Burlington, but what the men have received on the latter is not stated. The higher rate on the Galesburg-Quincy run is said to be paid to "a few" of the heaviest trains; the road's letter shows four heavy trains and two others. The comparison with the Northwestern fast mail train, and with the Chicago, St. Louis & Pittsburgh run, however, seems to substantiate the engineers' claim, and the 35-runs-per-month comparison goes to show that the Burlington made its men work harder for a given sum than do the other roads. The managers' circular which gave the average sums received by individuals on the various divisions for the month of November failed to state how many days or hours the men had to work to earn this money. It makes a great difference whether the men worked 50 or 100 hours per week. This circular showed average monthly wages of \$115, the Chicago division being the smallest (\$105) and the West Iowa division (\$129) the largest. The public's lack of sympathy was largely owing to the fact that these rates of pay appeared to be reasonable. The engineers should have seen this and taken vigorous means to show that they had to work very hard for their money, or brought complete and conclusive evidence that higher rates were nearly universal outside of the Burlington.

It is of no use now to tell the road that its rates were too low, because it has, so far as outsiders can judge, proved that it can get along without the men. Where the battle depends on main strength victory settles all questions.

The testimony before the Illinois Railroad Commissioners has shown that there was some careless handling of engines the first few days of the strike, an "engineer in charge of laboratory tests" acknowledging that he took charge of a locomotive and ran over a grade crossing of another road (the collision at Fulton, Ill., Feb. 27, as before reported) at 45 miles an hour, cutting the other road's train in two. He had a pilot, but there seems to have been a misunderstanding. There has been considerable testimony concerning drunkenness, but it is contradictory, and the Commissioners' report will have to settle this question. The public will doubtless forgive the road for these "little idiosyncrasies" of its new men; it certainly would if it realized how frequently these mishaps occur when engines are manned in the regular and ordinary manner.

English Railroad Legislation.

The contest now going on in Parliament over the provisions of the proposed Railway and Canal Traffic Act, deals chiefly with two points. One is the question of terminals; the other is the familiar story of local discrimination.

Terminal charges have for many years past been a fruitful source of disputes in England. The English railroads are at least nominally subject to a system of maximum rates, prescribed in the special act of Parliament by which each road is chartered. For the most part, these acts are quite inoperative. They were framed without regard to the necessities of railroad business, on the model of the old turnpike and canal acts; in fact, the details are much more in the nature of canal tolls, such as Mr. James F. Hudson

wishes to see enforced to-day, rather than railroad rates. It is hardly necessary to say that such schedules proved of no use. A railroad company could do its business with a great deal better economy for the public as well as for itself, than any outside parties possibly could. The prescribed tolls and maxima remained a dead letter because the railroads could do almost everything so much cheaper than was at first anticipated.

But not quite everything. The item of terminal charges was not reduced so fast as the others, and in some cases tended rather to increase. The enormous growth of traffic which was produced by the unexpectedly low rates itself produced a corresponding enlargement of freight stations, especially in large cities, where the land had to be purchased at a price enhanced by the very facilities the railroads had afforded. In order to save cartage the freight stations were brought nearer the consumer, and in some cases the interest on the cost of stations alone amounted to \$1.50 per ton handled. This nominally increased the railroad charge, but is really a substitute for the cost of the cartage previously necessary. This increase of station expenses could be only partially reduced by modern appliances for handling traffic expeditiously, such as hydraulic cranes, hoists and capstans. Station service became relatively dearer, if not absolutely so. The relative rates for short and for long distance traffic would, by this cause alone, have been thrown quite out of the proportion contemplated in the original act.

But this was not the only cause at work, nor the chief one. As the system grew, rates were based less upon comparative cost and more upon what the traffic would bear. But the English railroads were more afraid to avow this principle than we have been in America. Instead of boldly saying that railroad business had outgrown the cost theory as clearly as it had outgrown the toll theory, they tried to stretch the old schedules to fit the new practice. They invented all sorts of distinctions about station terminals and other kinds of terminals. It seems quite clear that the English public does not approve of these distinctions; it is by no means clear whether they are going to be able to do anything in the premises. It is necessary for the community that rates should be based on value of service. If they insist that the railroads shall pretend to base them on cost of service, there is no telling where the deceit will stop. It is very hard to enforce a law which says that a man must tell one lie but must not tell two.

The contest with regard to local discrimination deals with more familiar ground. In the original bill it was provided that any departure from schedule rates graded according to distance should throw upon the railroad company the burden of proof to show that it was justified; in other words, that they must make out a case of dissimilar circumstances and conditions. This clause has been changed by the House of Lords in such a way as to be stricter than at first, and not to allow exceptions for special circumstances. It seems likely that the bill will become law in a form stricter than our own Interstate Commerce Act. Discriminations in favor of long-distance traffic are even more disliked by the English public than by our own, because they seem to favor the foreign producer at the expense of his home competitor. If the English producer finds that American meat, or French hops, or Norwegian lumber are carried past his door at less rates than he himself has to pay, he quickly concludes that something is wrong. Had our Boston rate case dealt with rebates on imports instead of on exports, there would have been widespread public indignation against the railroads. This is substantially the case in England to-day.

The reason for this state of things is not hard to find. Most of the great English consuming centres, and notably London itself, are directly accessible from the sea. It thus often happens that the cost of transportation of foreign products to the point of final consumption is less than that of the corresponding domestic products from the interior of England itself. Or, to put the matter in another way, the natural protection to the home producers, due to cost of transportation from foreign countries, ceases to exist in such cases, and the foreign producer may have a positive advantage. Now, if the railroads wish to participate in this traffic, they must accept the situation, and content themselves with a share of the very low foreign competitive rate. If they wish to have meat carried from New York to London via Liverpool instead of direct, they must make a rate from Liverpool to London which shall not exceed the difference between the rate which they can get from New York to Liverpool and that which the public can get from New York to London. On these conditions they can participate in this traffic, and not on any

others. It is hardly necessary to say that this narrow margin gives little to pay fixed charges, and that if these discriminations were checked, the roads would simply abandon this traffic at a slight loss to their stockholders and no great gain to any one else. They certainly would not reduce the local rates to the level of the competitive ones.

It seems likely that some such general result will be reached, though it is as yet impossible to tell how stringent the law will be made. But it is at least worth while for American exporters to watch matters and see whether there is likely to be any change which will affect them. The difference will not be so much in the final result as in the routes and methods by which our products will reach their destination. The process of readjustment may cause us some slight trouble; otherwise, we imagine that the English railroad shareholders will be the chief losers, and the London steamship and water property owners the only ones who have much to gain.

The Telephone in Freight Offices.

We are constantly reminded, and perhaps with increasing frequency, of the old truth that the manner which characterizes our dealing with customers, the way in which we stroke a cat's fur, often proves to be an important factor in the general sum of success. A railroad must not only give customers what they rightfully demand, but often more than they have a right to ask for, simply to show a liberal spirit toward the public. A correspondent sends us a communication in this line referring to a detail of railroad management which is well worthy of attention. A wholesale merchant in New York, talking with an out-of-town customer, found it necessary to find out at once the rate on certain goods to an interior point, which was a local station on competing roads. He referred to his tariffs and found that one of the roads had not yet published its rate to the point in question, its line to that town having been but recently completed. He therefore telephoned to the freight office of the road, but received in response a positive declination to quote rates over the telephone. The case was afterwards referred to the general freight agent, with an offer of a written guarantee assuring all risks of misunderstanding, but this officer simply confirmed the position of his subordinate. The point raised by our correspondent is that the telephone has come to be so universally used that, whatever its faults, which are acknowledged to be many, it must be accepted and put up with. Merchants use it for buying and selling, quoting prices, and all sorts of communications in countless instances every day. The old messenger system, which was also defective, in that it often involved the risk of verbal mistakes, cannot now be endured. The question is, whether a railroad freight office, intimately connected as it is with the business life of a town or city, should stand out against such an overwhelming majority? To this there would seem to be but one answer. The railroad is no better than any one else, and when it suits its own convenience does use the telephone, as for instance to inform consignees of the arrival of perishable freight or to tell shippers that their goods remain undelivered at distant points. Although claims for overcharges based upon misunderstandings regarding rates are disagreeably numerous, they must be got along with in the best manner possible. The strict legal right to repudiate any rate agreement which is not in writing is undoubtedly, but the moral right of the matter is not changed, and expediency is not affected by this point. Our correspondent in conclusion suggests that a stipulation concerning the assumption of risks by shippers might be sent out by freight offices or perhaps incorporated in the tariffs.

The fundamental difficulty is found perhaps in the old railroad custom of employing cheap help, and of all the cheap help in a freight office the duty of answering the telephone is doubtless generally assigned to the cheapest. The art of communication by telephone is somewhat like telegraphing train orders, an important part being the getting of a response which shall give positive assurance that the original communication has been correctly received. A good cross-questioning lawyer could doubtless give rates through a telephone in such a way as to lure the fellow at the other end into talking back a satisfactory repetition in the way of acknowledgment, but a five dollar office boy has not had enough experience in life to do this. The trouble with stipulations in tariffs or bills of lading or written agreements to be filed away, is, that like an old pine pail, when they are wanted in subsequent months or years they will not hold water; or at least the rights they are intended to protect will have to be fought for

in the courts. Poor Richard's maxim about going instead of sending, when one wishes his business to be satisfactorily attended to is as good now as ever; and as long as we act on the assumption that we must delegate duties, the simplest rule is to find the best person possible to delegate them to. There being no reasonable escape from the telephone, set a careful and experienced clerk to attend to it.

The New York bill to compel the disuse of the car stove has been modified so far as to extend the time for introducing other means of heating, from May, 1888, to November. It is now as follows:

It shall not be lawful for any steam railroad doing business in this state, after the first day of November, eighteen hundred and eighty-eight, to heat its passenger cars, or other than mixed trains, by any stove or furnace kept inside the car or suspended therefrom, except it may be lawful, in case of accident or other emergency, to temporarily use such stove or furnace with necessary fuel. Provided, that in cars which have been equipped with apparatus to heat by steam, hot water or hot air from the locomotive, or from a special car, the present stove may be retained to be used only when the car is standing still. And provided also that this act shall not apply to railroads less than fifty miles in length nor to the use of stoves of a pattern and kind to be approved by the railroad commissioners, for cooking purposes in dining-room cars.

This act shall take effect immediately.

Legislation against the "car stove" naturally involves a precise definition of the object which it is sought to do away with. One definition which has been furnished us by a correspondent is as follows: "A car stove is any heater upon whose fire-inclosing surface the heating of the car depends; or any heater, of which two or more are required to warm a car; or whose parts, which are contiguous to the fire, shall at any time require to be, or can be, heated to the degree of redness." The Car Builders' Dictionary defines a car stove as "an apparatus * * * in which a fire is made for warming a * * * car by direct radiation. When the warming is effected by convection as with warm air, hot water, etc., the entire apparatus is called a heater." The definitions of Worcester and Webster are much less precise, and are worthless for the present purpose. Our correspondent's definition is obviously framed to exclude from the operation of the law some of the independent heaters now in use, but we can hardly indorse it as a whole. The first clause is important. Heating by radiation from the surface is incompatible with safety. The second clause is inconsistent. If one heater is safe, two are safe. The third clause is well enough, but not material. If the heater has a safe inclosure it does not much matter whether the material inclosed is incandescent coals alone, or coals and red-hot iron.

But it will be noticed that the bill specifies not only a stove but a *furnace* as well, and Webster defines a furnace as "an inclosed place where a hot fire is maintained, etc." It appears that the intent of the law is to do away with any method of heating which requires fire in or under a car. Perhaps a furnace carried on top of a car would escape the provisions of the law as now framed, but it looks as if all independent heaters would be ruled out. But the bill has not yet become a law.

The device for splitting the notches on the quadrant of a locomotive reversing lever known as the May double latch* has been adopted by the roads composing the Cincinnati, New Orleans & Texas Pacific system, and is also being tried on ten engines on the Chesapeake & Ohio, six on the Richmond & Danville, four on the Pennsylvania, and three on the Canadian Pacific, and Lake Shore & Michigan Southern. It is also being applied to several engines building at the Cooke Locomotive Works.

The cost of this simple little device is very small, and it is far more convenient and efficient than the temporary expedients,—a small loose bolt, etc.—used by some economical engine runners to split the notches. The saving in coal caused by splitting the notches will be apparent to any one who tries the experiment, and on some locomotives, under the charge of the writer, amounted to fully 3 lbs. per mile. As these engines were small, with only 15 x 22 cylinders and 48 in. drivers, the economy with a full sized main line engine would probably be greater, unless the working notches were in exactly the right positions, which, of course, can very seldom be the case.

From the last annual report of the General Manager of the Illinois Central we give some data of cost of locomotive service and of maintenance of way for 1887, and for the 10 years ending with 1887. The miles operated were 2,355 and the engine mileage in millions of miles was: Passenger trains, 3.9; freight, 7.1; construction, 0.4; switching, 2.2; total, 13.6 million miles. The cost of locomotive service was distributed as follows:

	Average. Per engine-mile. for 10 years.	1887.	Inc. or Dec. Per cent. I. 5.2
Cars hauled	11.86	12.47	
Oil, waste and tallow	0.299	0.30	
Fuel	5.37	4.98	D. 7.8
Wages, engineers and firemen	5.41	5.58	I. 3.1
Repairs	3.64	3.29	D. 9.6
Cleaning	0.20	0.22	D. 24.1
Total	15.01	14.37	D. 4.2
Miles per pint oil	13.77	12.25	
Miles per ton coal	31.83	28.31	

The average number of cars hauled increased from 1881, when it was 10.94, to 1886, when it was 12.77. The cost of oil and waste has remained practically constant, but the cost of fuel was less in 1887 than in any former year except 1879, when it was 4.72 cents, and 1886, when it was 4.90 cents. Repairs have decreased on the whole, but not uniformly, from

year to year. For the first five years of the decade they cost 3.82 cents and for the last five years 3.42 cents per mile. Wages of engineers and firemen alone, of the elements of cost, have increased over the average, and were greater per engine mile in 1887 than in any other year. The rate received per ton per mile was last year 1.09 cents, which was considerably less than in any former year. For eight years the average was 1.355 cents and it has declined steadily from 1.54 cents in 1880 to 1.09 in 1887. It appears, therefore, that while the road has been steadily reducing expenses to meet a steadily declining revenue per unit of traffic, it is not the enginemen who have suffered.

The following table shows the cost of maintenance of way per mile of road and per engine mile run. It will be seen that in this element of expense of operation also, the cost has diminished as the service has increased:

Miles	Cost per mile.	Millions of engine-miles.	Cost per engine-mile.
1878	1.256	\$5.6	5.1
1879	1.387	4.98	5.5
1880	1.220	6.12	6.5
1881	1.320	5.30	7.0
1882	1.409	6.34	10.2
1883	1.028	6.58	10.7
1884	2.064	6.0	10.1
1885	2.066	6.13	11.2
1886	2.149	5.43	11.6
1887	2.355	5.73	13.6

Steel brake shoes of the Ross pattern are now the standard practice on the Pennsylvania as regards driver brakes, and are found to give much better results than the old style shoe, the locomotives being able to keep out longer. The Ross shoe, as is well known, is recessed where the tire is worn by contact with the rails. As the bearing is on the flange and outside of the tread, the profile of the tire is maintained. The Pennsylvania has also used some shoes of this shape on Pullman cars, but the results are not yet sufficiently conclusive to permit any judgment as to their suitability for the purpose. Cast iron appears hardly strong enough for the Ross shoe, the great breadth and peculiar form of which requires the shoe to be made of a strong material.

The removal of the Brighton Beach Hotel is being completed as we go to press. The first stage of the removal was successfully accomplished on April 3 and 4, and was described in our last issue. On the first day six locomotives were employed, but on the second day four were found sufficient. The hotel has been moved clear of the sea and persons can now walk between the hotel and the high-water mark. The twenty-four tracks used have been removed from the rear of the hotel and laid in front. The nominal capacity of the cars used is 60,000 lbs., not 50,000 lbs., as printed in our last issue.

Messrs. Whittlesey & Wright, of Washington, D. C., will shortly publish a little book that will be of great value to all persons interested in the subject of car-heating, whether as railway officials, engineers or inventors. It will contain an abridgement of the United States patents pertaining to continuous car-heating that expired prior to Jan. 1, 1888. Classified lists of all the United States patents relating to car-heating, and some analogous patents, granted prior to Jan. 1, 1888, will also be given.

NEW PUBLICATIONS.

A Manual of Steam Boilers; their design, construction and operation. By R. H. Thurston, M. A., D. C. Eng., New York. John Wiley & Sons. 1888. 8vo, pp. xv. 671. Price, \$6.

The object of the author, as stated in his preface, is to furnish work suitable for use as a text-book, and also serviceable for persons who design, construct and manage steam-boilers; covering, in short, all practical demands, that required for a trade manual excepted. The preface further states that in the steam tables furnished "the constants of Rankine are adopted, not so much because it is considered by the author, if we may judge from what is to-day known on the subject, that they are quite as likely to be correct as any others, but for the reason that they have become so generally accepted among engineers, and differ so little from the values taken by earlier authorities, that it is probably wisest and safest to retain them, at least until the exact quantities are better settled than to-day." The reader is also informed that Mr. Porter's steam tables, which differ somewhat from those given in the treatise, "may be used where separate tables in convenient and compact form are desired, * * * but the engineer should use either the one or the other exclusively in any one piece of work." It may be added that Professor Thurston, in the present treatise, wherever he has occasion to use the data taken from steam tables, apparently prefers Porter's to the tables which he has published.

The work commences with an historical description of the steam boiler, presenting illustrations of the earlier forms, a statement of the requisites of good design, a discussion of the possibilities of improvement, a general classification of forms, and illustrations of modern types. In sketching the gradual development of the steam boiler, the transition from ancient to modern types is made with great abruptness, the forms used on the early ocean steamers being entirely neglected. In the classification adopted, the Fairbairn and elephant types of boiler, so largely employed in Europe, have no place, unless it be under the heading "peculiar forms." Four types of modern sectional boilers are shown, and it is stated that "modifications of the Root boiler, known as the Belleville, and others have been used with success by French

builders of marine machinery." As a matter of fact, the Belleville boiler, if indeed it be a modification of the Root boiler, has been modified so much as to lose all resemblance to the latter, and, being the only sectional boiler which has proved successful for marine purposes, might well have received more recognition than is accorded to it in the present work.

Following the historical account and statement of general principles of design are two chapters, condensed principally from former works of the author on the strength of the materials used in boiler construction, the strength of riveted joints, flues, cylinders, pipes, stays and stayed surfaces, the principles of combustion, the nature of fuel, air required for combustion and heat of combustion. Throughout the work the numerical data are given generally, but not always, both in English and metrical measures. For the metrical measures the author does not use the system of abbreviation adopted by the International Congress, but employs a system of his own. Numerous formulas are given in the chapter on strength of materials, and sometimes the signification of the letters in these formulas is explained, while in many other cases there is no explanation, and as the formulas, with few exceptions, are not accompanied by examples, their value is greatly diminished. As an illustration, on page 143 there is a formula for the minimum thickness of a lap-welded flue,

$$t = 2.2 d.$$

The letter *d* is used in preceding formulas to represent the diameter of the flue, but that can hardly be the signification in the present case. It is not a bad plan for a writer to work out an example for every formula which he uses, especially in preparing a work intended for general reference.

The nature of heat is next taken up; the manner of measurement and transfer, and the efficiency of heating surface is calculated according to methods given by Professor Rankine. The mechanical theory of heat and the general laws of thermodynamics are explained, after which the formation and properties of steam are considered, and a calculation of the stored energy of water, taken from a former work by the author, is presented. The general requirements of a good design are fully discussed, including the principles of draught and the proportions of chimneys. Illustrations of well-designed stationary and marine boilers are given, the manner of setting stationary boilers, the sizes and forms of safety valves, feed apparatus, pressure gauges and other accessories. Chapter X. treats of boiler construction, machine and hand riveting, bracing and staying. Model forms of specifications and contracts are presented, and there are practical remarks on the management and care of boilers. In Chapter XIII. the author considers boiler efficiency, as follows:

1. The efficiency of the steam boiler
 $\frac{\text{Heat utilized in the production of steam.}}{\text{Total heat of combustion.}}$
2. The commercial efficiency
 $\frac{\text{Quantity of steam produced.}}{\text{Total cost of its continuous production.}}$
3. The efficiency of a given boiler plant
 $= \frac{\text{The amount of steam made by the boiler per dollar of working expense.}}{68 \text{ and } 92 \text{ per cent.}}$

For the commercial efficiency, the author works out four cases, as follows :

Annual cost.	Stationary— I. Cornish. II. Multi-tubular. III. Tubular, type I. IV. Tubular, type II.	Marine— I. III. IV. II. tubular. III. tubular. IV. tubular.
Total cost per square foot of heating surface... \$0.34	\$0.38	\$1.60
Cost of fuel per pound burned hourly on each square foot of grate surface.....	8.50	9.00
	22.50	3.00

For the commercial efficiency of a fixed plant, the author works out four cases, as above, and finds the rate of combustion, in pounds, hourly per square foot of grate surface, for maximum commercial efficiency:

I.	II.	III.	IV.
8.	10.	16.	20.

The foregoing results are obtained by theoretical investigation, based upon data which appear to be reasonable; but it would have been more satisfactory if the theoretical results had been checked by some practical examples.

The chapter on steam-boiler trials which follows is taken largely from the report of a committee of the American Society of Mechanical Engineers, and thus represents the views of some of the most experienced engineers in the profession. The concluding chapter is practically a reprint of the author's Treatise on Steam Boiler Explosions.

The foregoing brief summary shows that the work under consideration is very comprehensive and contains much valuable information. The author has drawn largely from other authorities, not even disclaiming the trade catalogues of boiler-makers. Great care is ordinarily necessary in using different authorities, if it is desired to produce a consistent treatise, and in the present case some contradictions occur. It may be useful to the reader to have a few of the most important inconsistencies pointed out. A statement on page 13, that "the best boilers of nearly all makers of acknowledged standing are practically equal in merit, although of diverse forms," does not accord well with the efficiencies of different forms as tabulated above, and is utterly inconsistent with the data contained in a table of Horse-Power and Economy, page 336.

On page 13 the reader is informed that "The cold water should enter where the cooled gases leave, and the steam should be taken off farthest from that point." Should the reader find that this would necessitate pumping water into the steam space, let him turn to page 221 and find that "The rapidity and completeness of the circulation of the waters

* This device was illustrated in the *Railroad Gazette*, Oct. 8, 1886.

in a well-designed boiler are such that the point of introduction of feed-water is a matter of minor importance, so far as the boiler itself is concerned; and the engineer usually seeks to enter the feed in such a manner as shall evade risk of injury by irregular strains due to excessive differences of temperature in its different parts."

On page 302 a point of prime importance is discussed as follows: "Only sectional boilers should be placed under buildings. Shell-boilers should have boiler-houses constructed for them apart from the larger and more important structures to which they are auxiliary, and this precaution is especially advisable for cases, as mills, in which many lives may be endangered. The risk involved is not great where these boilers are well designed and constructed; but the prudent engineer avoids even moderate risk where a life is involved." A dogmatic assertion of this character by an experienced engineer might well spread dismay among the thousands of steam-users who have boilers situated in absolute disregard of the foregoing dictum, were it not for the qualification, modification or contradiction on page 644: "A well-designed, well made and set and properly managed steam boiler may be considered as safe. Explosions never occur in such cases." In fact, the aim of the concluding chapter is apparently to show that boiler explosions are unnecessary and preventable. When an author fights himself in this manner, he is the only one hurt.

It would extend this notice unduly to mention all the inconsistencies of the work, and most of them are of minor importance and readily discerned. There is another class of statements which may be called either erroneous, misleading or incomplete, but many of these could not be considered without discussing at length the subjects of which they treat. Such statements, when made by a writer of Professor Thurston's reputation, are apt to be accepted as authoritative, and to obtain wide currency. A few of these statements will be briefly considered.

On page 13 is found the remark, "The extent of heating-surface simply, in all the best forms of boiler, determines the efficiency, and the disposition of that surface in such boilers seldom affects it to any great extent." To answer this statement fully would require the publication of numerous experimental results; but most experienced engineers probably know that furnace heating-surface is usually the most efficient, that the first foot of tube-surface is many times more efficient than the last foot, and that tubular boilers have often been rendered more efficient by closing some of the tubes, thus reducing the heating-surface.

On page 15 the quality of the steam required for power and for heating is discussed: "In general it may be said that where the heat and steam are required for the impulsion of an engine, the higher the safe pressure and the practically attainable temperature at which the supply is effected, the more efficient the utilization of the heat. * * * Where heating simply, without transformation into work, is intended, the principal and only very important requisite, usually, is to provide such thorough protection for the system of transfer and use, that no wastes of importance can take place by radiation or conduction. The character of the steam made, as to humidity, is in this case comparatively unimportant; but in the preceding case it will be found essential that it should be always dry, and it is often much the better for being superheated above the boiling-point due to its pressure." In heating, temperature is desired, and the higher the temperature of the heating medium, the more efficiently and cheaply will the heating be effected. Did space permit, numerous tests could be quoted in support of this assertion, which is familiar to every engineer who manages the heating plant of a building or factory.

The criticisms which have been made of this work all refer to important questions in the generation and use of steam and the errors and inconsistencies, of which some examples have been given, detract considerably from the value of the treatise under consideration. But the reader can scarcely fail to perceive from the summary given in this notice that the work possesses considerable merit. The arrangement is not as systematic as could be desired, all the data and discussions relating to the same subject not always being placed in the same chapter. Now that the use of natural gas and petroleum as fuel have become so extended a modern treatise on steam boilers might well give descriptions and illustrations of the prominent forms of burners and furnaces and some description of modern forms of super-heaters, and statements about properties of superheated steam, would have added largely to the value of the work.

TECHNICAL.

Locomotive Building.

The Brooks Locomotive Works, of Dunkirk, N. Y., have just delivered to the New York, Chicago & St. Louis eight Mogul locomotives, and will soon deliver the remaining seven of the order.

The Georgia Pacific has received four Mogul freight locomotives from the Rogers Locomotive and Machine Works, Paterson, N. J. The road has also just placed an order with the New York Locomotive Works, Rome, N. Y., for three switch engines.

The St. Louis, Vandalia & Terre Haute will soon contract for the building of four heavy passenger locomotives.

Car Notes.

It is said that the improved Westinghouse freight brake will shortly be applied to all stock trains on the Cleveland, Columbus, Cincinnati & Indianapolis, and that the use of the continuous brake will be extended to all freight trains in the near future. It is said that when the stock trains are so equipped, the time between St. Louis and Buffalo will be shortened four to six hours.

The St. Charles Car Co., St. Charles, Mo., has just delivered to the Buffalo, Rochester & Pittsburgh 100 cars. The firm is also building eight chair cars for the St. Louis & San Fran-

cisco, and 350 stock cars for the Atchison, Topeka & Santa Fe.

The Indianapolis Car Works have completed 800 coal cars for the Atchison, Topeka & Santa Fe, and have delivered 700 of the 1,000 box cars they are building for the same company.

The American Live Stock Express Co., of New York, has contracted with the Carlisle Manufacturing Co., of Carlisle, Pa., for the building of 58 stock cars, to be equipped with the Westinghouse car brake, 42 in. Allen paper car wheels and the Sisam canting lever trucks, made by the Sisam Machine Works, Brooklyn, N. Y. These trucks have been in service under the company's cars for the past four months and have proven satisfactory.

Bridge Notes.

The Edge Moor Bridge Works, Edge Moor, Del., will soon commence the construction of an iron bridge at Navassa, S. C., for the Cape Fear & Yadkin Valley.

The town of Middlefield, Mass., will build an iron bridge over the Westfield River, to cost \$1,300.

The Wrought Iron Bridge Co., Canton, O., has been awarded the contract for the iron bridge over the Kalamazoo River, at Kalamazoo, Mich. The contract price is \$14,000.

The contract to build a bridge over the Coosaatchie River, at Memphis, Tenn., has been awarded to the Motherwell Bridge Co., of Ohio, at \$5,995.

At the annual meeting of the King Iron Bridge & Mfg. Co., Cleveland, O., the present officers were re-elected.

The Little Rock Bridge & Tunnel Co. has been incorporated to construct a bridge at Little Rock, Ark. Among the incorporators are J. W. Phillips, St. Louis, Mo., and J. C. England of Little Rock, Ark.

The Rochester Bridge & Iron Works have been awarded the contract for building three bridges over the tracks of the Rome, Watertown & Ogdensburg and New York Central & Hudson River roads in Rochester, N. Y.

The Kaw Valley Bridge Co., of Kansas City, Kan., has been incorporated in Kansas, with a capital stock of \$40,000, by E. R. Fisher, Kansas City, Kan.; Calvin P. Fox, Kansas City, Mo., and others.

The Lassig Bridge & Iron Co. has been incorporated in Illinois, with a capital stock of \$300,000, by Moritz Lassig, William G. Schniglau and Charles H. Hawkins.

A bridge is prop set at Dearborn street, Buffalo, to cost \$30,000, and at Elmwood avenue, to cost \$50,000, both to cross the Scajaquada Creek.

The contract for the bridge over the Colorado River at Ballinger, Tex., has been awarded to S. Leveredge, of Dallas, at \$14,780. There will be an iron span of 180 ft. and 250 ft. of trestle.

The contract for an iron truss bridge over the Brazos River at Waco, Tex., has been awarded to Lee, Slaughter & Co. at \$49,500.

A bridge will be built over the Arkansas River, at Fort Smith, Ark., by the Kansas & Arkansas Valley Railroad. C. F. Huggans, Van Buren, Ark., is Chief Engineer.

The contract for a bridge across the Meramec River, at Short's Ford, near Moselle, Mo., has been awarded to the King Iron Bridge & Manufacturing Co., of Cleveland, O., at \$3,750.

The proposed bridge over the Mississippi at Memphis, which is to be built by the Kansas City, Memphis & Birmingham, is to be 75 ft. high, and the channel spans will be 700 ft. long.

The Louisville Bridge Co. has just completed an iron bridge over Village Creek, at Easley, Ala.

The County Commissioners will build a bridge at Canon City, Col. Address J. H. Peabody.

An iron bridge will be constructed across the Trinity River at Fort Worth, Tex. Address Chenault & Hill, Fort Scott, Kan.

The County Commissioners will build a bridge at New Florence, Mo.

A bridge will be built over the St. Bernard Canal at Dorenville street, New Orleans, La. Address J. N. Hardy.

The Commissioners of Fairfield County, O., will build five bridges. Address B. F. Dunn, Lancaster, O.

G. W. Coolidge & Co., Phenix Building, Chicago, have contracted for the bridge work on the Montana Central and for the iron work for the roofs of the Oregon Iron & Steel Co.'s works at Portland. Their contract for bridge work on the Minneapolis, Sioux Ste. Marie & Atlantic is now nearly completed.

The Fitchburg Railroad Co. is rebuilding the five-span iron bridge over Green River, at Greenfield, Mass., the Boston Bridge Co. furnishing the material. Two spans are already finished, and work is begun on the third. The new structure will be much heavier than the old one, which was built by the state management of the Troy & Greenfield road some twelve years ago. It will be completed early in the summer.

Proposals are wanted at Dover, Del., until April 17, for the erection of a bridge. Address William Fisher Levy, Dover, Del.

Proposals are wanted at Gates Centre, Kan., until April 23, for the construction of a bridge. Address Henry Porter, Bridge Commissioner.

A bridge will be constructed over the Mississippi at Okawaka, Ill.

Plans have been presented to the Middlesex Board of Freeholders for a new stone bridge over the Raritan River at New Brunswick, N. J., to cost \$132,000.

Manufacturing and Business.

Special circulars of air compressors for elevating acids, working pneumatic riveters and sinking caissons for piers of bridges, also of vacuum pumps for sealing incandescent electric lamps, have been issued and can be had by addressing the Clayton Air Compressor Works, 43 Dey street, New York.

Iron and Steel.

The March output of the South Chicago Works of the North Chicago Rolling-Mill Co. was 24,134 tons of ingots and 21,095 tons of rails in 49 turns.

Messrs. McIntosh, Hemphill & Co., of Pittsburgh, Pa., have completed a train of universal rolls for Carnegie, Phipps & Co. The total weight is 216,000 lbs., and with boilers and engines will cost \$60,000. They have also been awarded the contract of erecting the rail mill addition to the Duquesne steel mill, Duquesne.

The Greendale furnace, at Greendale, O., has been leased from the Columbus & Hocking Valley Coal & Iron Co. by the Greendale Furnace Co., of which J. A. Long is President and C. H. Bordman Vice-President and General Manager.

The Joliet Steel Co., of Joliet, Ill., is putting in two 60-ton Smith furnaces to heat billets for the new rod mill now being built.

Messrs. Jones & Laughlin, of the American Iron & Steel Co., Pittsburgh, Pa., are laying the foundation for the erection of a 25-in. mill for the purpose of rolling billets and blooms for making steel beams and channel irons.

The Reading Iron Works, Reading, Pa., have effected a settlement with their employees by which the latter agree to accept 7½ per cent. reduction in wages, and work is to be

resumed at all the company's idle mills. The Keystone Rolling Mill, controlled by the same company, resumed operations last week.

Etna Furnace, of the Etna Iron Works, Limited, at New Castle, Pa., will be blown out in a few weeks, for the purpose of being relined and repaired.

Henderson Furnace, of the Henderson Iron Co., Limited, at Sharpsville, Pa., has been blown out to be repaired.

The Elba Iron & Bolt Co., Limited, and the Continental Tube Co., of Pittsburgh, Pa., suspended last week. Their liabilities are reported at \$527,000, with assets of \$1,000,000. An extension will be asked. The mills, when in full operation, employ 900 men.

The new blast furnace of the Valentine Ore Co., at Bellefonte, was successfully blown in last week. The furnace has a capacity of about 100 tons per day and will give employment to between 150 and 200 men.

The Worcester Steel Co., of Worcester, Mass., is erecting a 20-ton St. John furnace.

W. H. Hartman has disposed of his half interest in the plant of the Hartman Steel Co., at Beaver Falls, to Andrew Carnegie, who now becomes the sole owner.

The Rail Market.

Steel Rails.—The market is very quiet, with prices held at about \$31.50 at the mill.

Old Rails.—There has been little or no business in old rails of late, and there are no inquiries. Quotations are: Tees \$21 and doubles \$21.50, both f. o. b. Jersey City.

Track Fastenings.—Bolts and nuts, 3c.; spikes, 2.15c.; angle plates, 1.9c., all delivered.

Car Heating Notes.

Messrs. Edward E. Gold & Co. have sold their works, patents and business to the newly organized "Gold Car Heating Company," whose capital stock, \$100,000, is fully paid up. The directors and officers are: Edward E. Gold, President; F. W. Wright, Treasurer; Samuel F. Gold, Secretary; Jonathan Wright, Egbert H. Gold, Charles W. Osborne and Frank J. Menzie. The office and works will remain at the corner of Frankfort and Cliff streets, New York. The company has already over 1,200 cars equipped with their system of continuous heating.

Mr. David Connell, formerly Superintendent of the Philadelphia Division of the Baltimore & Ohio, has designed and patented a system of continuous car heating, using steam from the locomotive. It also provides a safety stove for use as an auxiliary heater, surrounded by a circular group of Bundy radiating steam pipes. The experience and mechanical knowledge of the inventor has enabled him to skillfully design the details of the system. It has not yet had practical trial.

The following changes have been made in the officers of the Safety Car Heating & Lighting Co., 160 Broadway, New York: President, Henry R. Towne; Vice-President, James C. Bayles; Secretary and Treasurer, J. J. Slocum. F. M. Wilder has resigned as General Manager, and his duties have been assumed by the Vice-President.

Rupture of the Pont d'Arcole, Paris.

On the 18th of February, at 1 o'clock in the afternoon, a sharp explosion was heard on the Arcola bridge, over the Seine, in Paris, and those who were crossing at the time felt a violent shock. It was supposed to have been an explosion of gas, but on examination it was found that the floor of the bridge was cracked across, having a maximum opening of about 30 centimetres. The crack enlarged and the travel on the bridge was stopped. This is one of the first iron bridges built in France. It has a single arch of 80 metres span, and the width of the roadway is 20 metres. It was built in 1855. No definite cause for the occurrence is given by our authority, which is the *Annales Des Travaux Publics*.

Hours of Duty on English Railroads.

An English Parliamentary return has just been published showing "the number of weekly paid servants who were, during the months of July, 1886, and January, 1887, on duty on the railways of the United Kingdom for more than 12 hours at a time, or who, after being on duty more than 12 hours, were allowed to resume work with less than 8 hours' rest." The returns show that a very large number of men were on duty more than 12 hours at a time. It is stated that the fog in January delayed the freight trains, and the heavy seaside and excursion traffic in July necessitated many extra trains, and consequently both months required an exceptional amount of overtime.

Some of the General Managers append explanations of the causes of the long hours worked. Mr. Lambert (Great Western) says:

"In many instances, though the men were required to remain on the company's premises to await the arrival of a train, or for some other special purpose, they had no duties to perform. In many other instances, though the intervals between the times of coming on and going off duty may have been more than twelve hours, the duties were very light, or were not of a continuous character. Some of the men who were working more than twelve hours one week had much shorter hours the next. The company's regulations provide for an interval of rest of at least nine hours between the times of going off and resuming duty, and the instances shown in which men have resumed duty after a shorter interval of rest than nine hours were mainly the result of accident or other exceptional circumstances."

Mr. Findlay (London & Northwestern) says:

"Engine drivers and firemen, especially in July, were often not upon the foot plates during the whole of the time represented, but were waiting at stations for their return train, and resting themselves in the intervals. The instructions given to the men are that when by force of circumstances they find they are likely to be fifteen hours on duty continuously, they are to request the agent at the first station they stop at to telegraph to the nearest locomotive foreman to have relief ready on their arrival at the place, and to cause them to do this a fine has been imposed in each case in which it has been found that the order has been disobeyed. It will thus be seen that every man whose duty is at any time unduly prolonged, has only to seek for relief to obtain it. Many passenger conductors work long hours on certain days, and short time on other days, to balance their working."

It appears that generally the men are paid for the whole time on duty, no deduction being made for the time they are waiting for the return train, etc.

Henderson Steel.

The iron made from the Alabama ores contains too much phosphorus for steel making by the pneumatic or open-hearth process, and it is generally reckoned that the South will have to depend on the North for steel until the Texas ores are developed. Mr. James Henderson, a well-known metallurgist, thinks he has discovered a method of utilizing this pig-iron for steel making. His method, as far as has been given to the public, is to run the melted iron directly from the blast furnace on to the hearth of a calched dolomite, powdered and mixed with 10 per cent. of fluor spar. This is called the purifying chamber, in which the molten iron is

treated with ore to remove the silicon and half the carbon—an operation which takes about $2\frac{1}{2}$ hours. From the purifying chamber the charge is run into the converting chamber, where in about $2\frac{1}{2}$ more hours the phosphorus and remaining carbon is removed. About half an hour is required for repairing the hearths, so that the operation is accomplished in about one fourth the time required by the Siemens-Martin process. Mr. Henderson claims that "the results by this process are equal, from any inferior metal, to those obtained from the purest charcoal iron, and the steel obtained welds with the same facility that iron does. Iron has been made by the process without a trace of phosphorus from pig containing 0.65 per cent of this element, and with but a "bare trace" from pig with 2.67 per cent. in it. An analysis of the slag showed very little phosphorus, that element having been carried off with the products of combustion, and it is intended to carry these gases through condensers in which the water will be cooled by the ammonia process to just above the freezing point, in which the phosphorus will be collected as a solution of any desired strength, which it is thought will be directly applicable as a fertilizer to the land.

It is proposed to enlarge the plant at Birmingham, Ala., to a capacity of 120 tons of steel per day. Mr. Norton, in the last report of the Louisville & Nashville Railroad, asserts that the production of pig-iron on its road will be 3,000 tons daily. The daily capacity of blast furnaces now built or under construction in Alabama is about 4,000 tons, so Mr. Henderson will have no lack of raw material on which to operate.

Metal Cross-ties in Russia.

The use of metallic ties has not made much progress in Russia. Some were laid on the Moscow-Kuska line, but were taken up again, as they proved too expensive for maintenance, and especially in the spring and fall seasons the cost of surfacing proved to be much higher than with wooden ties. The cost of iron being greater and that of wood lower in Russia than in some other European countries it is not astonishing to find that this is the case. At the present prices of the two materials in Russia it is estimated that iron ties cost $1\frac{1}{2}$ times as much as oak ties not treated and $2\frac{1}{2}$ times as much as those of pine treated with chloride of zinc, the basis of comparison being for iron ties a weight of 112 lbs. with an admitted durability of 35 years, as against a durability of 10 years for treated and 6 years for untreated wooden ties.

The Chapin Pneumatic Process for Making Wrought Iron.

This process, which has been successfully tested at the works of the Bethlehem Iron Company, is a combination of the pneumatic or Bessemer process and the old mode of producing wrought iron by puddling.

As described in the Bulletin of the American Iron and Steel Association, the melted iron is first run into a converter, which is lined with ganister or other suitable acid lining, the same as in the Bessemer process, where it is blown to the point where the silicon in the iron has been so far reduced that the power of its acid product is broken and at the same time carbon enough is left to preserve, with its high degree of initial heat, the fluidity of the iron. The charge is then removed by the aid of a ladle to the ballers or revolving reverberatory furnaces, which are lined with a refractory oxide of iron or other oxide and heated by either coal or gas to a welding heat. Under the slow motion of the baller the charge is soon made up into a ball and is then removed to a squeezer. The acridous cinder from the converter is to be left in the ladle, and by supplying an abundance of basic material the phosphorus and sulphur are removed in the baller.

The Chapin Company claim that by the use of the same high class pig used in the great steel process, they get an iron particularly pure, and therefore soft and admirably adapted to all the uses to which this class of iron is usually devoted. But the principal claim is that they are able to take pig which on account of its high phosphorus is ruled out of use in the Bessemer process, and produce a superior quality of wrought iron at a saving of about \$5 per ton compared with puddled iron from the same stock. As \$5.50, the price paid for puddling at Pittsburgh, is about the highest price paid in the world, and as it declines in England to 6s. 6d., \$1.57, the claim that \$5 can be saved may be considered the maximum saving possible.

The Bethlehem Iron Company say of it that the economy will depend largely on the adaptability of the plant to the process, but as the process itself is based on well understood principles, there is no reason why it should not be more economical than hand puddling.

Accident Insurance in Russia.

The railroad companies of Russia carry on a system of accident insurance on their own account. Travelers are insured for each journey, by paying a premium of one cent on their fare, and in case of injury receive indemnity proportionate to the fare paid.

Electric Train Lighting.

The Timmis system of electric lighting is being tried on a train running between London and Manchester on the Midland Railway (England). The chief feature of the system is that it secures "through lighting" in a train by the adoption of the Union battery stored in each vehicle, and by this means any car may be put into a siding, or be slipped from a train, without interfering with the maintenance of the light. In case one or more of the vehicles are slipped or break loose from a train, the lamps in them, if lit, remain lighted, and if they are not lit, provision is made for their being automatically lighted up.

The Timms Car Coupler.

A trial of this vertical plane coupler was made at Columbus, Ohio, on the 6th inst. Cars were coupled both on sharp curves and tangents, and the results are stated to have been very satisfactory. The inventor claims that this is the only coupler possessing the following features: The knuckle is readily locked at two points, the lock is in the bore of the head and requires no operating lever mounted on the car, and the knuckle receives all the wear and saves the head.

The Whitner Uni-Lever.

Several of these switches have been undergoing trial on the Lehigh Valley Railroad for nearly a year, and we learn that they have satisfactorily passed the severe trials of the winter. The company has lately put the switch into use at North Penn Junction and other points on the line. Similar trials, with entirely satisfactory results, are reported on other roads.

THE SCRAP HEAP.

A Gastronomic Director in Danger.

It is a common saying that few bishops and no cooks have hitherto been killed in railroad accidents. The truth of this proposition was jeopardized by a recent occurrence, which will compel our accident editor to adopt a new heading in his classification of railroad smashes.

During the trial trip of President Newell's new private car to New York last week a little incident occurred which was

not down on the bills. It was the explosion of the range boiler, which damaged the car to the extent of \$600 and gave the cook a continuance of his life's lease by a very close shave. The cook was preparing dinner and had a little trouble with the boiler, the pipes clogging up and preventing a flow of water. He was just stooping over to remove some viands from the cooler when the superheated steam blew out the boiler front. The flying plate carved a spring chicken, cutting off a portion as clean as a knife and distributed some vegetables over the kitchen ceiling. Had the cook been standing he would have been struck in the head. The car is now at the shops again undergoing repairs.

A New Depot at Decatur.

Plans are being prepared in the office of the Illinois Central for a new union depot to be erected at Decatur, Ill., to cost about \$100,000, and work will be commenced in about 90 days.

A Station Annunciator.

The Louisville & Nashville is trying a device for announcing in the cars the name of the next station. It was invented by George C. Logan, Manager of the New Orleans Express Company. It consists, substantially, of a breadth of narrow canvas, the ends being brought together so as to make an endless belt and moving vertically over two rollers. The rollers are controlled by springs, by which they are set in motion or brought to a state of rest at the pleasure of the manipulator. On the canvas are painted the names of the several stations on the road, and the whole is inclosed in a handsome walnut case 2 ft. high, 18 in. wide and 6 in. deep. Through a narrow, glass-covered aperture in the front may be seen the names of the stations as they successively move into the field of view. The apparatus is operated by a spring which gives motion like that of a clock when it is wound up. When a station is reached by the train, a stop which prevents the movement of the cylinders is withdrawn by a simple device, and the cylinders being put in motion, bring to view the name of the station reached; at the same time a small gong, which is part of the machine, is rung to attract attention. When the next station is reached the bell rings again and the name of the place comes to view. The apparatus may be manipulated directly by the conductor or brakeman, but it is so arranged as to be connected with the pipes of the air brakes, and in this way the engineer or conductor, by simply touching a valve, can simultaneously operate an annunciator in each car.

The Fontaine Locomotive Eclipsed.

A most remarkable locomotive, the invention of a New York gentleman who is too modest to allow his name to be mentioned, will soon burst upon an astonished world. Among other remarkable features too numerous to particularize, the boiler will evaporate 18 lbs. of water per lb. of coal. The inventor's assurances on this point are emphatic, and his explanation is lucid and leaves the reader in a completely evaporated, not to say dry condition, for after the fuel has indulged in the 18 lbs. performance, it has sufficient surplus energy or waste heat left to do further wonders, for "before the steam passes into the cylinders it is superheated by contact with an area four times greater than the area of evaporating surface, and thus dried it passes into the cylinders with six pounds of water for each pound of coal that generates it."

This is a good deal to swallow all at once (quite a long drink in fact), but more remains behind. The boiler pressure is to be 210 lbs. per sq. in., though the inventor states that it would be higher were the gauge of the road wider. The boiler is also rectangular, possibly because there are milestones on the Dover road and not because the inventor "worked two years to discover some base of computation for a round boiler, and could find none; I could not even determine the evaporating surface, much less the quantity of water which should be carried under pressure, and the volume of steam to be held in reserve."

A useful hint to young, very young, locomotive designers is embodied in the following aptly quoted proverb of Confucius:

"The proper extent of heating surface is determined from the wheel-base and rail-centres."

It cannot be too strongly urged upon the minds of the young that to follow this teaching will insure a happy old age and will remove all blotches and spots from the complexion, and pimples from the nose, while any person following any other method of proportioning heating surface will be liable to a criminal prosecution and the forfeiture of any common stock he may hold in the Wabash, Nickel Plate or West Shore.

The new engine will weigh over 100 tons when loaded, but "the absence of bent pipes" will, of course, render her easy on the track and bridges. A ton or two is neither here nor there with a locomotive that "can haul 2,250 tons at a single trip, on an ordinary track, a distance of 145 miles, say from New York to Albany, at a speed of 14 miles per hour, and at a cost of \$104 less than the same tonnage has ever before been transported."

Parson's Switch and Block System.

A model of General Parson's system of working switches and block signals from the locomotive is on exhibition at 29 Broadway, New York. The inventor proposes to work switches a mile away from the engine, and should the signals be disregarded, apply the brakes automatically.

Paris Exposition of 1889.

Our French exchanges report fair progress in the work of preparing the buildings for the great exposition of 1889. The staging for the machinery building was being erected in March. This staging will have a height of upward of 150 ft., and will move on rollers, being supported at 20 different points. The Eiffel tower is progressing, the floor of the first story being now under construction. The Minister of Commerce has signed an agreement with a syndicate of electricians to light the building and ground during the exhibition.

Fireproof Partitions and Ceilings.

A certain Mr. Rabitz has designed a fireproof construction for partitions and ceilings, which consists in the application of a lime mortar to a metallic web, while the latter is tightly stretched by wires interlaced in the meshes. The mortar is applied to a thickness of from $1\frac{1}{2}$ to 2 in. for partitions and from $1\frac{1}{2}$ to $2\frac{1}{2}$ in. for ceilings. Hydraulic cement has also been used for this purpose. The system has been adopted in the construction of a new theatre in Hall.

The Strike Against the "Q."

"Did you know that the Rock Island passenger train east nearly failed to start yesterday afternoon?" asked a railroad man. "No; how did it happen?" "Why, there was a Chinaman on board, and the engineer thought that if he took out the train he would be helping the queue."—*Des Moines (Ia.) Register.*

An English Railroad Boycott.

The spectacle of railroads acting the part of Quarantine Commissioners and discouraging travel between a small-pox

stricken city and seaside and health resorts is somewhat novel, but according to an English exchange such a state of things exists in Sheffield, the inhabitants of which feel sorely aggrieved at the railway companies continuing to practically boycott the town on account of the small-pox scare. The people contend that the epidemic has been greatly exaggerated; that every person who was ill was believed to be down with the dreaded disease; and that the railroad companies, by stopping all excursions last winter, intensified the panic. The railways are still stubborn and have declined to run any excursion trains to or from Sheffield in Easter week; and, if rumor is true, contemplate refusing excursions from Sheffield to the principal seaside resorts all the summer. If Sheffield people cannot get to the sea, this season, there will be a small rebellion in Hallamshire.

Welding Rails by Electricity.

An exchange states that a Baltimore electrician has invented a method of welding steel rails by means of electricity. The ends of the rails after they are placed in the track are welded together through the application of a transformed electric current, and are afterward tempered so as to make the joint as hard as the rest of the rail. The welding apparatus is carried on the pilot of an engine or on a construction car, and it is claimed that a joint can be made in less than half a minute. The inventor proposes to thus make continuous rails a quarter of a mile in length, having expansion joints only at intervals of that distance, the rails being fastened at the centre so as to expand in both directions. This plan, if successful, would settle the great Fisher rail joint question, but the accumulated expansion and contraction in such long lengths of solid rail would be formidable.

Australian Railroads.

Excepting the small break made by the Hawkesbury bridge, which is being rapidly closed by the Union Bridge Company of this city, the system of Australian railroads is now connected by a through inter-colonial line from Farina in South Australia, through Adelaide, Melbourne, Sydney, to Charleville in Queensland and North Australia.

Production of Pig Iron in Germany.

According to statistics gathered by the Verein of German Iron and Steel Manufacturers, the pig iron production of the German Empire, including Luxemburg, was, from Jan. 1 to Nov. 30, 1887, 3,547,497 tons, as against 3,054,436 tons for the same period in 1886.

A Picturesque Delay.

The Denver & Rio Grande "Modoc" cannon-ball lightning switch was eight hours late yesterday because of a sudden movement of scenic America in the Black Cañon.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

The state of Iowa filed a bill in the state court to enforce an order of the state board of railway commissioners, holding that certain tracks in the streets of a city are, under the laws of the state, and the ordinances of the city, public highways, and not the private property of the defendant company, and that the defendant was under obligations to pass over such tracks the cars of other railway companies when necessary to reach their customers' warehouses, and fixing charges for the switching done by the defendant. The city had given defendant permission to lay its tracks upon certain streets, upon condition that they should be public, and open to the use of the citizens. The railroad took the case into the Federal Court, which tribunal holds that, in imposing this condition, and fixing the rate to be charged, it does not clearly appear that the state is interfering with or regulating commerce between the states in violation of the federal constitution. The act of Congress, Feb. 4, 1887, section 3, provided that common carriers should afford equal facilities for the interchange of traffic between their lines. "But this shall not be construed as requiring any such carrier to give the use of its tracks or terminal facilities to another carrier engaged in like business." The defendant had bound itself by a contract with a city to allow other roads to use its terminal facilities, and a state had provided by statute that different companies might have a joint use of such facilities. The Federal Court rules that the contract with the city, and the rights of the second companies to such joint use, were not affected by the above act, but the same must be determined by the statutes of the state.¹

In Louisiana the Supreme Court lays it down that the actual cash value of property is the legal basis of taxation, by which is meant the price it would sell for cash, in the ordinary course of business, free from all incumbrances, otherwise than at forced sale. Neither the price of investment in, nor the net revenues or profit earned by, a railroad, is a fixed criterion of value in assessment matters. The market value of a road; yet it does not hold when the corporation becomes insolvent.²

A North Carolina statute provides that no injunction shall issue to restrain the collection of any tax, but that all taxes shall be paid, and demand made in writing for their return, when, if not complied with, suit may be brought to recover them. The Supreme Court rules that an injunction should not issue, at the instance of a railroad company, to restrain the collection of taxes levied on its lands, which both the Federal and state supreme courts had decided were not, under its charter, subject to taxation.³

In Texas it is held that a railroad is not liable in exemplary damages for injuries caused by the malicious acts of its agents engaged in running a train, unless such acts were authorized by the company or subsequently ratified by it with full knowledge of the facts.⁴

In Indiana the Supreme Court decides that a state has no power to levy a tax upon the earnings of a sleeping-car company engaged in the business of transporting passengers from one state to another. The matter of interstate commerce is a national matter with which no state can in any wise interfere. The jurisdiction of the Federal government absolutely excludes the state from directly or indirectly hampering or taxing the commerce between states. The statute attempting to authorize it is itself without force. That it restricts the amount of the tax to be paid by the corporation to the distance which passengers are carried through this state does not relieve it of the objection; for the tax it assumes to levy is upon inter-state commerce, and not upon the internal commerce of the state. The tax cannot be sustained upon the ground that the appellee can be compelled to pay a tax upon its gross earnings for the privilege of doing a local business in the state.⁵

In Illinois the road statutes provide that the commissioners of highways of each town shall annually ascertain how much money must be raised by tax for the current year, and assess and levy the same as a road tax. The Supreme Court rules that when the commissioners have annually assessed, but have failed to make a levy against the property of a railroad company for nine years, they are not authorized by the statute to meet and determine that the property shall pay a gross sum in one year, as a road tax, for the past nine years.⁶

In Illinois the Supreme Court holds that where the au-

erty conferred upon the officers of a county by a vote of the people to issue bonds in aid of a railroad was upon condition that the railroad company should locate its machine shops at a certain point in the county. The county had no right to take stock and issue bonds except upon the terms and conditions specified in the vote of the people, and any other action taken by the county would not be obligatory or binding upon the taxpayers, and a levy to pay the interest upon bonds issued without authority cannot be enforced.⁷

- 1 State v. C. M. & St. P. R. Co., 33 Fed. Rep. 391.
- 2 Morgan's L. & T. R. & S. Co. v. Iberia, 3 South. Rep. 507.
- 3 Raleigh & G. K. Co. v. Lewis, 5 S. E. Rep. 82.
- 4 Gulf, C. & S. F. R. Co. v. Moore, 68. W. Rep. 631.
- 5 State v. Woodruff Sleeping & Parlor Coach Co., 13 West. Rep. 311.
- 6 O. & M. R. Co. v. Calvin, 13 West. Rep. 273.
- 7 Ostott v. People, 13 West. Rep. 290.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Baltimore & Cumberland Valley Extension, special meeting, Chambersburg, Pa., April 27.

Bay View, Little Traverse & Mackinaw, annual meeting, Harbor Springs, Mich., May 2.

Canadian Pacific, annual meeting, Montreal, Que., May 9.

Chicago & West Michigan, annual meeting, Muskegon Mich., April 18.

Atchison, Topeka & Santa Fe, annual meeting, Topeka, Kan., May 10.

Chicago, Burlington & Quincy, annual meeting, Chicago, Ill., May 16.

Chicago, Rock Island & Colorado, special meeting, Denver, Col., April 30.

Delaware & Hudson Canal Co., annual meeting, 21 Cortland street, New York, May 8.

Detroit & Bay City, annual meeting, Detroit, Mich., May 3.

Harrisburg & New England, annual meeting, Philadelphia, Pa., May 7.

Kansas City, Fort Scott & Springfield, special meeting, Kansas City, Mo., April 29.

Kansas City, Independence & Lee's Summit, annual meeting, Kansas City, Mo., April 19.

Kansas City, Springfield & Memphis, special meeting, Kansas City, Mo., April 20.

Lake Shore & Michigan Southern, annual meeting, Cleveland, O., May 2.

Lawrence, Emporia & Southwestern, annual meeting, Lawrence, Kan., April 19.

Lehigh & Eastern, special meeting, Philadelphia, Pa., May 29.

Louisiana & Missouri River, annual meeting, St. Louis, Mo., May 2.

Mahopac Falls, special meeting, 69 Wall street, New York, April 19.

Missouri, Kansas & Texas, annual meeting, Parsons, Kan., May 16.

Michigan Central, annual meeting, Detroit, Mich., May 3.

New York Central & Hudson River, annual meeting, Albany, N. Y., April 18.

New York, Chicago & St. Louis, annual meeting, Cleveland, O., May 2.

Pennsylvania & Western, Philadelphia, Pa., May 2.

Richmond & Danville, special meeting, Richmond, Va., May 21.

St. Louis, Arkansas & Texas, annual meeting, St. Louis, Mo., May 3.

Topeka, Salina & Western, annual meeting, Topeka, Kan., May 1.

Union Pacific, annual meeting, 101 Tremont street, Boston, Mass., April 25.

Vicksburg & Meridian, annual meeting, 40 Wall street, New York, May 7.

Washington, Western & Southwestern, special meeting, Staunton, Va., April 26.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Eel River, semi-annual, \$1 per share.

Raleigh & Gaston, semi-annual, 2 per cent.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Master Car-Builders' Association, annual convention, Alexandria Bay, N. Y., commencing June 12.

The American Railway Master Mechanics' Association, next annual convention, Thousand Islands, N. Y., June 19.

The New England Railroad Club meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

The New York Railroad Club meets at its rooms, 113 Liberty street, New York City, on the third Thursday of each month.

The Western Railway Club meets in Chicago the third Wednesday in each month.

The Central Railway Club meets at the Tiff House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The American Society of Civil Engineers holds meetings on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street, New York.

The Boston Society of Civil Engineers holds its regular monthly meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday of each month.

The Western Society of Engineers holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.

The Engineers' Club of St. Louis meets the first and third Wednesday of each month till June.

The Engineers' Society of Western Pennsylvania meets in Pittsburgh the third Tuesday of each month.

The American Train Dispatchers' Association will hold its fifth annual meeting at Louisville, Ky., June 12.

The National Association of General Passenger and Ticket Agents will hold its fall meeting in Saratoga, N. Y., Sept. 18.

The National Association of General Baggage Agents will hold its next meeting in New York City July 18.

Minneapolis Society of Civil Engineers.

A regular meeting was held April 5. The resignation of Mr. J. H. Barr was accepted, and he was elected an honorary member. Mr. J. S. Haman was elected a member.

The committee on sanitation appointed at the last meeting reported that Health Officer Kilrington had been asked to address the society on sanitation in Minneapolis. Dr.

Kilrington gave a history of his work as a health officer, describing the laws as they now are, stating that they are quite sufficient, but that people need to be educated; that there is a general supervision of contagious diseases, foods, etc. An interesting account was given of the successful method adopted for dealing with small pox in the city. The state law being exceptionally good, there is little trouble in limiting the spread of disease. Some account was also given of the water supply of the city, with analyses, and a resolution was passed offering the aid and hearty co-operation of the society in all endeavors to better the sanitary condition of the city.

Engineers' Club of St. Louis.

A regular meeting was held April 4. Russell Parker was elected a member. Resolutions were adopted concerning the death of Mr. Frederick Shickle, member of the club. A communication from Mr. L. E. Cooley, President of the Council of Engineering Societies on "Public Works," was made a special order for the next meeting, April 17. The Secretary read a paper on Railroad Location: Field Practice in the West, by Willard Beehan. The paper was generally discussed. Prof. Nipher explained to the club a calorimeter which he had prepared for the purpose of determining the heat value of fuels. It is quick and accurate. The apparatus was shown and test made.

Western Society of Engineers.

A regular meeting was held April 8. The following members were elected, Daniel A. With, Paul K. Richter, E. B. Meattyard. The committee on National Public Works submitted a report announcing that they had received a publication from the Executive Board of the Council, containing the modification of the Culom-Breckinridge bill. A copy of this publication was sent to each member of the society with a request from the committee for a contribution of \$2 from each member on society account, and as much on individual account as each member can afford. The committee invited discussion of the proposed legislation and the adoption of a resolution approving the general purpose of the bill.

Engineers' Club of Philadelphia.

A regular meeting was held March 17. Mr. A. Marichal read a paper on the Testing of Cements, and asked for the appointment of a committee of five who would recommend a practical method of testing cements, which, on paper were as follows:

1. If masonry work is made under contract, the specifications should state the required properties of the mortar and not of the cement. A cement may give splendid results when tested hard, and yet the mortar may be of the poorest kind.

2. When the object is to determine the relative value of different brands of cement, tests should be made with different proportions of sand in order to ascertain which is the most economical cement.

3. These tests should be made under similar conditions;

the temperature, the manipulation, the quality of sand, the speed and uniformity in applying the load, etc., are all important factors. They should be constant; otherwise the results will not be reliable.

4. The compressive strength is of the greatest importance in ordinary construction; unfortunately it cannot be ascertained with any degree of accuracy. The cement is injured before it is crushed.

It was observed that an expansion of 4 per cent. was taking place in a cement pavement; it was due to the hydration of magnesia contained in excess in the cement. Some mortar should be placed in a glass tube and some water poured on top; if the glass breaks, the cement is unfit for work exposed to dampness, and should be analyzed.

The Secretary presented, for Mr. F. H. Robinson, a description of the manufacture of gunpowder, and Prof. Redway followed with a discussion of the chemical reaction which takes place during the explosion of gunpowder and other explosives, giving a summary of the results of experiments and investigations. Mr. L. F. Rondinella presented a paper upon incandescent lighting.

American Society of Mechanical Engineers.

The Seventeenth Meeting of the American Society of Mechanical Engineers will convene in the City of Nashville, Tenn., on Tuesday, May 8, at 8 p. m., and will adjourn on Friday of that same week.

The headquarters and Secretary's office will be in the Maxwell House, corner of Church and Cherry streets.

The following papers are to be presented in the sessions and discussed: J. S. Coon, "Duty Trials of Pumping Engines;" Jay M. Whitham, "Surface Condensers;" R. H. Thurston, "Large and Enlarged Photographs and Blue Prints;" R. H. Thurston, "Proportioning Steam Cylinders;" John T. Hawkins, "Automatic Regulator for Heating Apparatus;" John T. Hawkins, "A Plea for the Printing Press in Mechanical Engineering Schools;" C. C. Collins, "A New Method of Inserting and Securing Crank Pins;" Geo. L. Fowler, "Estimating the Cost of Foundry Work;" Henry R. Towne, "A Safety Car Heating System;" Wm. F. Mattes, "Connecting Rods;" Wm. J. Baldwin, "Notes on Warming Railroad Cars by Steam;" Fred. A. Schaeffer, "A Foundry Cupola Experience;" A. F. Nagle, "The Best Form of Nozzles and Diverging Tubes;" John Reese, "The Tetra Basic Phosphate;" L. S. Randolph, "Strains in Locomotive Boilers;" W. L. Clement, "Steam Excavators;" Geo. H. Barrus, "An Electric Speed Regulator;" Geo. H. Barrus, "The Effect of Circulation in Steam Boilers on Quality of Steam;" Geo. H. Barrus, "Memoranda on the Performance of a Compound Engine;" H. L. Binsse, "A Short Way to Keep time and Cost;" F. W. Dean, "The Distribution of Steam in the Strong Locomotive;" John M. Sweeney, "River Practice of the West;" J. Burkitt Webb, "A Persistent Form of Tooth;" Wm. Hewitt, "Wire Rope Fastenings;" Harry de Parsons, "The Latent Curves of Fishes as Offering Resistance;" J. E. Denton, "Mechanical Significance of Determination of Viscosity of Lubricants."

Subjects and queries will also be presented for the topical discussions, which have proved so interesting and profitable at the recent meetings. Special railroad rates have been secured for this meeting under the certificate plan. It has been found that the members who start from New England, New York and Pennsylvania can procure special comforts over the New York, Lake Erie & Western. If a number large enough can be secured, the members can have their own cars from New York City through to Nashville, and similarly on the return. By this plan also, a stop over in Cincinnati of several hours is provided for. These cars will leave New York (Chambers street depot) at 9 a. m. (Twenty-third street at 8:55), on May 8; will run special to Port Jervis, overtaking there the regular train and connecting at Elmira at 5:41 p. m., with the train leaving Philadelphia via the Lehigh Valley Railroad at 9 a. m.

Arrive Cincinnati at 1 p. m., May 7, leave at 8 p. m., via Louisville and Nashville. Arrive Nashville 7 a. m., May 8.

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flow of sap in trees. Mr. R. K. Wright, Jr., formerly connected with the engineer corps of the Panama Canal, made some remarks on that work. He spoke particularly of the cumbersome methods of management, from which great delay has resulted. He also gave some facts about the extravagant prices at which contracts had been let. There were some further remarks on the subject.

The following were elected:

Members: William Crulman Ambrose, Francis Webster Blackford, Jr., Howard Breen, Edward Carlos Carter, John Joseph Donovan, Frank Louis Fuller, Bruce F. House, James MacFarlane, Charles Clemons Rose, Horace Edward Stevens, Charles Frederick Stowell, Arthur Newell Talbot, Charles Chancellor Wentworth.

Associate: George Henry Crafts.

Juniors: William George Clark, Arthur Leland Cornell, Edward Berton Kent, William Willis Penney, Louis Lincoln Tribus, Harry R. Wheeler.

A National Organization of Railroad Accounting Officers.

At the recent meeting of railway accountants, held at Washington, a motion was unanimously adopted providing for the appointment of a committee of fifteen to consider the desirability of forming a "National Organization of Railway Accounting Officers," similar to that of the officials of other departments of railroads. It was provided that this committee should be appointed by the chairman of the Washington convention (Mr. Kirkman), who is also to be chairman of the committee.

Association of Engineering Societies.

The Montana Society of Engineers, with a membership of about 37, has been admitted to the Association.

American Water-Works Association.

The eighth annual meeting will be held in Cleveland, O., April 17, 18 and 19. The headquarters will be at the Holenden Hotel.

PERSONAL.

Alfred Sully has tendered his resignation as President of the Richmond & West Point Terminal Co., to take effect April 12.

L. B. Rock, who for about 20 years has been Superintendent of the Northern Division of the Chicago, Milwaukee & St. Paul, has been compelled to retire from his position on account of failing health. Mr. Rock is 63 years old and a Canadian by birth.

Peter Hayden, one of the projectors of the Columbus & Hocking Valley Railroad, and its first President, died in New York April 6, at the age of 81 years. He was largely interested in various manufactures and a director of the National Park Bank, of New York.

—Peter J. Bayles, who has been the editor of the *Iron Age* for the past 20 years, has retired from that position, and will be succeeded by Charles Kirchhoff, Jr., who has been associate editor for some years, and was before that associate editor of the *Engineering and Mining Journal*.

—A. L. Mohler, who since October, 1882, has been connected with the St. Paul, Minneapolis & Manitoba as General Freight Agent, with the exception of about nine months in 1886, when he held the position of Land Commissioner, has been made General Superintendent, to succeed J. M. Egan, who resigned to become General Manager of the Chicago, St. Paul & Kansas City. Mr. Mohler's first experience in the railroad service was as warehouse and office clerk on the Chicago & Northwestern.

—Geo. V. Maus, Division Freight Agent of the Erie & Pittsburgh and Ashtabula & Pittsburgh divisions of the Pennsylvania, died in Erie, Pa., this week of apoplexy. He had been in the service of the Pennsylvania for 26 years, for 18 of which he was division freight agent. He was also connected with several manufacturing concerns. He resided in Georgia when the war broke out, and was drafted, but abandoned his property and reached the North after several adventures.

—R. H. Soule, General Manager of the New York, Lake Erie & Western, has resigned, to take effect April 30. The resignation of Mr. Soule is due to purely personal reasons. Few of the younger railroad officers in this country have applied themselves more intensely to their work, or progressed so rapidly as he has done. During the past 12 years he has succeeded in establishing his high reputation both in the mechanical engineering and operating departments, and in the art of handling men by severe and continuous study and labor, and the result is what might have been expected. He must rest, and he can well afford, and deserves to do so. The Erie road was never in its history in so good a condition as it has become under his management.

ELECTIONS AND APPOINTMENTS.

Allegheny Valley.—At the annual election this week the following were elected directors: George B. Roberts, John P. Green, John Scott, A. J. Cassatt, Charles E. Speer, N. Parker Shortridge, David A. Stewart, Edmund Smith and J. N. DuBarry.

Atchison, Topeka & Santa Fe.—James A. Justice has been appointed Roadmaster of the Leavenworth & Southern division, with headquarters at Leavenworth, Kan., and T. S. Cafferty, Roadmaster of the Leavenworth, Topeka & Southern, and the Kansas City, Topeka & Western divisions, including the Kansas City terminals.

Atlanta & Alabama.—The following directors have been elected: John H. Gordon, W. A. Handley, Henry B. Tompkins, Capt. L. E. O'Keefe, F. G. Hancock, Col. B. W. Frobol, Hon. A. C. Collier, Henry W. Crady, O. C. Fuller.

Bellair, Zanesville & Cincinnati.—T. M. Hobart has been appointed General Freight and Passenger Agent in addition to his duties as Auditor.

Birmingham Mineral.—R. L. Cobb has been appointed Chief Engineer, vice G. D. Fitzhugh, promoted.

Canada, La Crosse & Southern.—F. A. Roziene, Charles City, Ia., is President of this company, and C. F. Ainsworth, Black River Falls, Wis., is Vice-President.

Canton & Waynesburg.—The following appointments have been made: General Freight and Passenger Agent, Albert Rokusek, Cleveland, O.; Master of Transportation, S. D. Mayer; Master Mechanic, John Bean; and Chief Engineer, H. A. Kennedy, Canton, O.

Chesapeake & Ohio.—T. O. Barbour has been appointed Secretary and Treasurer, with office in Richmond, Va., vice E. T. Tournier.

Chicago, Lake & Southeastern.—John J. Safely, Waterman, Ind., has been chosen president and Otto Gresham, Indianapolis, Ind., secretary and treasurer.

Chicago, Milwaukee & St. Paul.—F. S. Atkin has been appointed Superintendent of the Northern Division, with office at Milwaukee, Wis., vice L. B. Rock, resigned.

Chicago & New Orleans.—The following are the officers of this company: George A. Sanders, President; H. W. Roker, 1st Vice-President; S. S. Parger, 2d Vice-President; H. W. Roker, Treasurer; A. G. Murray, Secretary. The general office is in Springfield, Ill.

Charles Hensel, of Springfield, Ill., has been appointed Chief Engineer, and William Vandercook, Locating Engineer.

Chicago, Santa Fe & California.—C. L. Nichols has been appointed Superintendent of the Kansas City Division, with headquarters at Ft. Madison, Iowa, appointment taking effect on the 29th inst. C. G. Sholes has been appointed Superintendent of Telegraph, with headquarters in Chicago, taking effect on the 15th inst.

Cincinnati & Birmingham.—The following officers have been elected: President, M. R. Campbell, Tullahoma, Tenn.; Vice-President, J. C. Morgan, Fayetteville, Tenn.; Treasurer, G. R. Crane, Tullahoma, Tenn.

Cincinnati, Richmond & Fort Wayne.—The following officers and directors were elected at the annual meeting: Officers: William Parry, President; W. O. Houghart, Vice-President; J. H. P. Houghart, Secretary and Treasurer. Directors: William Parry, Asabel Stone, Thomas D. Messler, William Traw, John H. Moorman, David Studebaker, J. N. McCullough, F. H. Short, W. O. Houghart, W. R. Shelby, John F. Miller.

Detroit, Charlevoix & Escanaba.—The following officers have been elected: President, R. M. Cherrie, Ironton, Mich.; Vice-President, Arthur A. Bleazby, Kalkaska, Mich.; Secretary, J. Milo Eaton, Charlevoix, Mich.; Treasurer, Fred J. Mecca; Attorney, A. D. Cruickshank, Charlevoix, Mich.

Fort Smith, Paris & Dardanelle.—J. P. Bates, Fort Smith, Ark., is Chief Engineer of this company.

Fort Worth & Rio Grande.—The following directors and officers were elected at the annual meeting held in Fort Worth last week: Directors, H. B. Hollins, W. H. Beers, New York; E. E. Denniston, Philadelphia; E. P. Alexander, B. B. Paddock, E. T. Hollis, O. B. Colton, W. F. Lake and W. W. H. Lawrence, Fort Wayne. Officers: B. B. Paddock, President; O. B. Colton, Vice-President; E. T. Hollis, Secretary; C. L. Horton, of New York, Treasurer.

Illinois Central.—F. R. Jamison has been appointed Traveling Freight Agent of the Springfield division, with office in Springfield, Ill.; L. L. Moseley has been appointed Traveling Freight Agent of the Chicago and Middle divisions, with office in Kaukaakee, Ill.

Indianapolis & Southwestern.—The following are the incorporators of this Indiana company: John S. Cooper and A. R. Kellogg of Chicago; A. B. Fitch, Terre Haute, Ind.; and John B. Lyon, William H. Alley, P. H. Blue, M. B. Wilson, F. E. Easter and John T. Hays of Sullivan.

Indiana Train Dispatchers' Association.—The following officers have been elected: President, C. W. Buchanan (Cleveland, Columbus, Cincinnati & Indianapolis); Vice-President, R. H. Starbuck (Indianapolis, Decatur & Springfield); Secretary and Treasurer, J. J. F. Sickel (Cleveland, Columbus, Cincinnati & Indianapolis).

International & Great Northern.—The following directors were elected at the annual meeting: Jay Gould, Russell Sage, A. L. Hopkins, S. H. H. Clark, Ira H. Evans, F. A. Rice, James A. Baker, B. W. McCullough, Henry B. Kane.

Kansas Railroad Commission.—James Humphrey has been re-elected Railroad Commissioner of Kansas by the Executive Council.

Kentucky Midland.—The officers of this company are as follows: Hon. Wm. Lindsay, President; A. H. McClure, Secretary; E. L. Samuel, Treasurer; James M. Douglass, Chief Engineer. The general office is in Frankfort, Ky.

Long Island.—The following Board of Directors was elected at the annual meeting held in Long Island City this week: Austin Corbin, J. Rogers Maxwell, Henry Graves, Henry W. Maxwell, Frederick W. Dunton, Joseph G. K. Duer, William B. Kendall, James D. Campbell, Alfred Sully, Edward Tuck, William G. Wheeler, John P. Townsend and Demas Barnes.

Long Island City & Flushing.—The following directors were elected at the annual meeting held this week: Austin Corbin, J. Rogers Maxwell, Henry Graves, Henry W. Maxwell, Alfred Sully, Edward E. Sprague, Frederick W. Dunton, James D. Campbell, Gilman S. Moulton, William G. Wheeler, Thomas F. Ward, E. B. Hinsdale and E. H. Atkins.

Louisville & Nashville.—G. D. Fitzhugh has been appointed Consulting Engineer.

Mann Boudoir Car Co.—The following directors were elected at the annual meeting: John G. Moore, Thomas C. Purdy, John Greenough, Edward Mahony, J. Taylor Ganse, J. H. Jackson, B. Y. Pippy, H. K. Bloodgood, Edward Kelly and C. G. Hedge. T. C. Purdy was elected President; E. Mahony, Vice-President, and C. G. Hedge, Secretary and Treasurer.

Mexican National.—William Mackenzie has been designated as Acting General Freight and Passenger Agent, vice J. A. Nangle, resigned.

Minneapolis, Sault Ste. Marie & Atlantic.—J. H. Hiland has been appointed Traffic Manager.

Morgan's Louisiana & Texas.—At the annual meeting held in New Orleans last week the following directors were elected: C. P. Huntington, of New York; A. C. Hutchinson, J. G. Schriever, John B. Richardson and Julius Kruttschnitt, of New Orleans. The directors organized by electing the following officers: A. C. Hutchinson, President; J. G. Schriever, Vice-President; John B. Richardson, Secretary and Treasurer; W. F. Owens, Superintendent, Louisiana railroad division.

Natchez, Jackson & Columbus.—B. S. Chase has been appointed Auditor, with office at Natchez, Miss., vice J. M. Kern, resigned.

New England Train Dispatchers' Association.—The following officers were elected this week: President, E. G. Smith; Vice-President, E. L. Dodge; Secretary and Treasurer, S. A. D. Forristall; Executive Committee, F. A. Carey, H. M. Forristall, E. H. Morse, C. N. Chevalier and E. H. Stevens.

New Orleans & Gulf.—The officers of this company are as follows: John R. Elder, President, Indianapolis, Ind.; Lloyd R. Coleman, Vice-President; M. R. Spelman, General Manager; Lucas E. Moore, Treasurer. General offices, New Orleans, La.

New Orleans & Spanish Fort.—The following directors and officers were elected last week: Directors—Charles

Schiff, Jules Aldige, Alfred Slidel, Robert Mott, John Glynn, Jr. Officers—Charles Schiff, President; John Glynn, Jr., Secretary and Treasurer; E. L. Tyler, Superintendent and Manager.

Ohio & Mississippi.—W. Hodgdon has been appointed Division Freight Agent, with headquarters in Springfield, Ill., vice R. I. Williams, resigned.

Omaha, Dodge City & Southern.—The directors of this new Kansas company are R. W. Evans, George B. Cox, George M. Hoover, R. M. Wright, W. C. Shinn, J. H. Crawford, D. F. Owens, C. E. Gallagher, B. F. Milton and E. O. Webenson, of Dodge City; J. P. Fair, of Mankato; R. R. Hays, of Osborne; Hill P. Wilson, of Hays City; N. C. Merrill, of Ness City; T. S. Haun, of Jetmore.

Pensacola & Memphis.—The following directors and officers have been elected: A. M. Johnston, Wyndham C. Jones and G. H. Kimball, of Cleveland; O. W. W. Hungerford and Joel P. Walker, of Meridian, Miss.; W. B. Wright and S. N. Van Praag, of Pensacola, Fla. Officers: President, A. M. Johnston, of Cleveland; Vice-President, W. B. Wright, of Pensacola; Secretary, W. C. Jones, of Cleveland; Treasurer, Clarke Hayes, of Bradford, Pa.; General Manager, W. W. Hungerford, of Meridian, Miss.; Chief Engineer, J. W. Gallop, of Meridian, Miss.

Rochester & Pittsburgh Coal & Iron Co.—George E. Merchant has been elected President.

St. Louis, Kansas City & Colorado.—The following are the officers of this company: George O. Manchester, President, Boston, Mass.; S. V. Emerson, Chief Engineer and Superintendent; D. S. Gallup, Auditor and Treasurer; John C. Orrick, Solicitor, St. Louis, Mo.

St. Paul, Minneapolis & Manitoba.—A. S. Mohler has been appointed general superintendent, with headquarters at St. Paul. J. O. Patter has been appointed master mechanic, with headquarters at St. Paul, vice W. T. Reed, resigned.

San Bernardino Central.—The officers of this California company are as follows: J. C. Monteith, President; Joseph Jarvis, Vice-President; A. E. Castle, Secretary; L. M. Holt, Treasurer. The general office is in San Diego, Cal.

San Francisco, Clear Lake & Humboldt.—W. H. H. Hart is President of this California company, and J. F. Fassett is Secretary.

San Pete Valley.—Theodore Bruback has been appointed General Manager, with headquarters in Salt Lake City, Utah, vice S. Bamberger.

Santa Ana, Fairview & Pacific.—This California company has elected the following officers: President, E. L. Buck; Vice-President, J. G. McMichael; Treasurer, S. Wellington Gardner; Secretary, Richard Louxen; Superintendent, A. L. Moye, all of Santa Ana, Cal.

Southern Pacific.—The following directors were elected at the annual meeting held in San Francisco last week: Leland Stanford, C. P. Huntington, Charles Crocker, Charles F. Crocker, Timothy Hopkins, W. V. Huntington, F. S. Douty, W. E. Brown, S. T. Gage, Ariel Lathrop, E. H. Miller, Jr.

W. H. Haydock has been appointed superintendent of the Northern Division, with office at San Francisco, Cal.

Suwanee River.—The following are the officers of this Florida company: President, Charles L. Buck; General Superintendent, W. N. McCormick. The general offices are at Elaville, Fla.

Tennessee Coal, Iron & Railroad Co.—The following officers and directors were elected at the annual meeting: N. Baxter, Jr., T. T. Hillman, E. Ensley, W. Hill, A. S. Colyar, W. M. Duncan, J. H. Inman, J. Bowron, L. M. Steger, J. P. Williams, J. R. Probst, A. M. Shook, D. C. Scales, S. W. Evans and S. Tate, Jr. The directors organized by electing the following officers: N. Baxter, Jr., President; T. T. Hillman, First Vice-President; J. P. Williams, Second Vice-President; E. Ensley, Chairman of Executive Committee; A. M. Shook, General Manager; J. Bowron, Secretary and Treasurer.

West Shore.—J. B. Davis has been appointed Assistant Division Superintendent, and I. A. McCormick, Trainmaster of the Buffalo Division.

West Virginia Central.—C. L. Bretz has been appointed General Manager, with office in Cumberland, Md.

Western New York & Pennsylvania.—Franklin S. Buell has been appointed Treasurer, vice John Dougherty, resigned.

Winona & Southwestern.—The following directors have been chosen to fill vacant places: John L. Blair, Plainfield, N. J.; W. P. Halstead, Scranton, Pa.; T. B. Walker, Minneapolis, Minn.; and W. H. Lyon, New York. William Windom was chosen President, vice E. J. Younans, resigned.

OLD AND NEW ROADS.

Atlantic & Gulf Railroad & Steamboat Co.—Preliminary surveys are being made for a road projected to extend from St. Lucie, Brevard County, Fla., northeast, a distance of about 100 miles, to Kissimmee or Orlando.

Baltimore & Cumberland Valley Extension.—A meeting of the stockholders will be held in Chambersburg, Pa., on April 27, to arrange for funds for laying the entire road with steel rails. It extends from Waynesboro, Pa., to Shippensburg, a distance of 26½ miles, and is leased to the Western Maryland for 50 years from November, 1881, at an annual rental of \$32,700.

Bellaire & St. Clairsville.—It is stated that surveys will soon be made for a proposed extension to connect with the Cleveland & Canton, at Sherrodsville, O.

Canada, La Crosse & Southern.—An extension from Black River Falls, Wis., southeast to Mather's, on the Wisconsin Valley, a distance of about 30 miles, is said to be contemplated.

Canadian Pacific.—The company has purchased the Waterloo & Magog road, which extends from Waterloo to Magog, Que., a distance of 23 miles, and is operated by the Central Vermont.

California Central.—The extension from Los Angeles to Redondo Beach, a distance of about 20 miles, has been completed, and opened for traffic.

California Southern.—The grading on the extension from Perris to San Jacinto, Cal., has been completed, and the road will probably be in operation by May 1.

Carolina, Knoxville & Western.—The location north from Greenville, S. C., to the North Carolina state line is completed, and Tanner & Co., Copwells, S. C., the contractors for the grading of this part of the road, have a force of 250 hands at work at Greenville.

Central, of Georgia.—On the extension of the Montgomery & Eufaula, south from Clayton to Ozark, in Dale County, track has been laid three miles.

Cincinnati, Alabama & Atlantic.—The divisions of the Cincinnati & Birmingham in Kentucky, Tennessee and Alabama, will be consolidated under this name. The road is projected from Huntsville, Ala., to Somerville, Ky. A. G. Negley, Tullahoma, Tenn., is Chief Engineer.

Chattanooga, Rome & Columbus.—The contract has been let to McLaughlin Bros., of Somerville, Ga., for grading a 10-mile section of this road.

Chicago, Kansas & Arkansas.—It is now stated that the company intends to push the construction of the road, which is projected to extend from St. Joseph, Mo., south to Fort Smith, Ark. Extensions are contemplated to Springfield, Mo., Memphis, Tenn., and to Arkansas City, Kan., and south from the latter place through the Indian Territory. Some surveying was done last summer. Walter G. Seaver, St. Joseph, Mo., is Secretary.

Chicago, Kansas & Nebraska.—It is reported that a contract has been made with the Union Pacific, by which the tracks of that company between River Bend, Col., and Denver will be used by the two companies, as will also be the new line to be built between River Bend and Colorado Springs. Two forces are now at work on the road in Kansas and another will soon commence on the line from River Bend.

Chicago, Kansas & Western.—Engineers in the employ of this company are surveying a line from Baird, Callahan County, Tex., on the Texas & Pacific, north about 18 miles to Albany, on the Houston & Texas Central.

Chicago & New Orleans.—The contracts for the construction of this road will probably be let as soon as the survey, which has just been commenced, is completed. It is to extend from Effingham, Ill., south to Metropolis or Paducah, about 150 miles. George A. Sanders, Springfield, Ill., is President.

Chicago, St. Paul & Kansas City.—The company has applied to the London Stock Exchange for the listing of \$4,450,000 first mortgage five per cent gold bonds in lieu of scrip. The St. Paul, Minneapolis & Manitoba has applied for quotation of \$1,000,000 consolidated mortgage 6 per cent gold bonds, interest reduced to 4½ per cent.

The citizens of Algona, Ia., offer to grade and bridge an extension of this road from Belmont, Wright County, to Algona. The distance is about 35 miles, and a survey for the line has been made.

Cincinnati & Birmingham.—It is thought the contracts will be let within two or three months to extend the road from Somerset, Ky., to Huntsville, Ala., and then possibly to Birmingham or Atalla. The surveys from Somerset to the Tennessee River have been completed.

Collingwood & Bay of Quinte.—The company proposes to construct a road from Collingwood, Ont., to Brighton, Ont. Mr. T. D. Wells, Brighton, is one of the promoters.

Columbus Southern.—The grading between Dawson and Albany, Ga., a distance of 23 miles, is nearly completed, and it is thought that the line will be finished early in July.

Covington & Macon.—Hillman Jackson, Jing Tavern, Ga., has contracted to build a 10-mile section of this road.

Denver & Rio Grande.—The engineers have commenced the survey for the extension from Sapinero, Gunnison County, Col., south to Lake City, in Hinsdale County, and the survey for the extension from Dallas to Rico will also soon be commenced.

Denver, Texas & Ft. Worth.—The extension from Washburn, Tex., to a connection with the Southern Kansas branch of the Atchison, Topeka & Santa Fe., a distance of 15 miles, was completed April 9.

Denver, Texas & Gulf.—Through passenger trains were put on April 9. The time from Denver to Fort Worth is 32 hours and to New Orleans 57 hours.

Detroit, Charlevoix & Escanaba.—The survey has been completed and the right of way secured from Kalkaska, Mich., to Charlevoix, a distance of 50 miles. The road is projected to extend from Kalkaska on the Grand Rapids & Indiana, no through Bellaine, Ironton, Charlevoix and Pinoskey to Mackinaw, a distance of about 170 miles. The contracts for building the road have not yet been let. The officers are given in another column.

Duluth, Rainy Lake & Southwestern.—The United States Senate has passed the bill granting this company the right of way through the Red Lake Indian Reservation in Minnesota, conditional upon the consent of the Indians.

East Tennessee, Virginia & Georgia.—McDonald, Shea & Co., Knoxville, Tenn., who have the contract for filling in the trestles between Macon and Rome, Ga., will sublet the work. It is stated that the company intends to expend about \$150,000 in enlarging its terminal facilities at Brunswick, Ga., and in other improvements there. W. G. & S. H. Corpening, of Birmingham, Ala., are said to have contracted to grade part of the extension from Jesup, Ga., to Jacksonville, Fla., for \$50,000.

Esquimalt & Nanaimo.—The road extending from Nanaimo, on Vancouver Island, in British Columbia, has been completed south to Victoria.

Florida Railway & Navigation Co.—Surveys will probably soon be made for a proposed extension from Plant City, Fla., south to Charlotte Harbor, on the Peace River, opposite Punta Gorda. The distance is about 75 miles.

Fort Worth & Rio Grande.—A meeting of the stockholders will be held in Fort Worth, Tex., to vote upon a resolution to increase the capital stock to \$3,500,000.

Haverhill & Lawrence.—The company is endeavoring to secure right of way through Lawrence, Mass. It is proposed to construct the road from Haverhill through North Andover and Woburn, a connection with some road which will give it an entrance into Boston independent of the Boston & Maine.

Hereford.—Bids will be received until May 1 for grading this road. D. Williams, Cookshire, Province of Quebec, is Chief Engineer.

Ilwaco Steam Navigation Co.—Work will probably soon be commenced on a road to extend from Ilwaco, Or., to Oysterville. L. A. Loomis, Ilwaco, Or., is interested.

Indianapolis & Southwestern.—Incorporated in Indiana to build a road from Indianapolis, south-westerly to Sullivan, passing through the counties of Hendricks, Morgan, Putnam, Owen, Clay, Green and Sullivan. The capital stock is \$1,500,000.

Kentucky Midland.—The surveys for about 235 miles of this road have been completed and over 100 miles have been located. The road as projected starts from Frankfort, Ky., and extends east through the counties of Franklin, Scott, Bourbon, Nicholas and Bath, and it is the intention to eventually extend it to a connection with the Norfolk & Western, probably at Pocahontas, Va. Negotiations are now pending for the construction of the road.

Lancaster & Hamden.—An extension from Hadley Junction to Newark, O., a distance of 13 miles, is proposed.

Los Angeles & Ocean.—Five miles of the grading from Long Beach towards Los Alamitos Bay, and three miles beyond that point and Los Angeles have been completed. James Campbell, Los Angeles, Cal., is General Manager.

Louisville, New Orleans & Texas.—It is reported that the company intends to build a 50-mile branch from Huntington, Miss., north through Bolivar to a point in Coahoma County.

Louisville Southern.—The track has been completed from Harrodsburg, Mercer County, Ky., north to Lawrenceburg, a distance of about 10 miles.

Memphis, Oxford & Columbus.—The county of La Fayette, Miss., has voted \$50,000 to the capital stock of the company to aid it in building its road, which is to extend from Memphis, Tenn., through Oxford and Columbus, Miss., to Tuscaloosa, Ala.

Mobile & Northeastern.—This road, extending from Glendale, Miss., to Clarksdale, a distance of 30 miles, will be changed from narrow gauge to standard. The general office is in Glendale, Miss.

Montana Central.—The headings on the 800-ft. tunnel at Basin in Jefferson County, Montana, met on March 27.

New Haven & Derby.—Work was commenced at Birmingham, Conn., this week, on the extension from that place to a connection with the Housatonic at Botsford, a distance of about 13½ miles.

New Roads.—A company has been incorporated by John Boyle, G. S. Lapham and others, with a capital stock of \$100,000, to construct a narrow gauge road from Silver City, New Mexico, to Pinos Altos on the Atchison, Topeka & Santa Fe. Application has been made for a charter for a road to be built from Calgary, Alberta, N. W. T., to some point in Manitoba.

New York & New England.—The company will, on April 23, put on an additional fast train between Boston and New York, which is to make the run in 6½ hours. It will leave Boston at 10 a. m.

Norfolk & Western.—It is stated that the company will soon commence work on the extension to Ironton, O., from point on the Clinch Valley extension. The distance is about 100 miles. Tracklaying has been completed on the Clinch Valley for 10 miles.

Northern Pacific.—Three parties of engineers are surveying a line between Boulder, Mont., and Three Forks, a distance of about 38 miles.

It is stated that surveys will be made for an extension of 6 or 8 miles from the main line to Elkhorn, Mont.

Old Colony.—At the special meeting of the stockholders held in Boston April 7, the lease of the Boston & Providence was approved. There were 63,837 votes cast, of which but 45 were against the measure. The directors were also authorized to meet the payments required to be made on May 1, by the issue of bonds or notes authorized at the last annual meeting. At a similar meeting of the Boston & Providence stockholders, the lease was approved with only 30 dissenting votes. The lease has already been approved by the Massachusetts Legislature, and is, therefore, now complete.

Omaha, Dodge City & Southern.—Incorporated in Kansas to construct a road from a point in Republic or Jewell County, southwardly through Cloud, Mitchell, Lincoln, Osborne, Russell, Ellis, Rush, Ness, Hodgeman, Ford, Gray, Meade, Haskell, Stevens, Morton and Stanton, an estimated distance of 360 miles. The general office is at Dodge City, Kan. The capital stock is \$700,000.

Oregon Railway & Navigation Co.—Contracts are being let for an extension which is to be built from the main line at Willow Creek, via Lexington, to Heppner, in Morrow County, Ore., a distance of about 45 miles, an extension of about 38 miles from Wallula to Estes.

Palmdale.—The grading and the bridge over the White-water River has been completed, and the road will probably be in operation early in May. It extends from Seven Palms, Cal., south 7 miles to Palmdale.

Pine Bluff, Monroe & New Orleans.—An extension from Swan Lake, Arkansas County, Ark., the present terminus, 33 miles from Pine Bluff, northeast through St. Charles and Indian Bay to Helena, a distance of about 65 miles, is said to be contemplated. The general office is in Pine Bluff.

St. Paul & Duluth.—The work of ballasting and reducing the grades between White Bear and Northern Pacific Junction, Wis., a distance of 119 miles, will soon be resumed. Between St. Paul and White Bear, 12 miles, and between Duluth and Duluth Short Line Junction, 8 miles, the road will be double tracked.

San Antonio & Aransas Pass.—Tracklaying on the western extension has been completed from Skidmore to Mathis, Tex., near the Neuse River. Grading will probably soon commence on the extension from Wallis to Houston, a distance of about 45 miles.

San Bernardino Central.—The surveys for this road have been nearly all completed. It is to extend from San Bernardino, Cal., south through Riverside to South Riverside, a distance of about 30 miles. Construction will probably be commenced in a month or two. The contracts for constructing the road have not yet been let. James C. Monteith, San Diego, Cal., is President.

San Diego, Cugamaca & Eastern.—Grading has been commenced on this California road and will be pushed to Lakeside, Tulare County, to which point the right of way has been secured and the location completed.

San Diego & Elsinore.—It is stated that grading for the road will soon be at work at Pomona and South Riverside, in addition to that at present at Elsinore. It is thought that the grading will be completed in about three months.

Sandusky, Ashland & Coshocton.—It is stated that the contracts have been let and works will commence shortly on this road, which is to extend from Sandusky, O., to Coshocton.

San Francisco, Clear Lake & Humboldt.—A mortgage has been filed in favor of the Metropolitan Trust Co., of New York, to secure the payment of the \$1,500,000 first mortgage bonds, which are to run 31 years with 6 per

cent interest. Fifteen bonds are to be issued as each mile of road is constructed. The road mortgaged extends from Napa City, Cal., north to Clear Lake. The grading forces are now at work on the road and have completed over 25 miles. W. H. H. Pettibone, San Francisco, Cal., is General Manager.

Santa Ana, Fairview & Pacific.—The contract for building this road between Santa Ana and Fairview, Cal., a distance of 7½ miles, has been let to McCrable & Co., of Los Angeles, Cal.

Saratoga, Mt. McGregor & Lake George.—John Kellogg, Amsterdam, N. Y., has been appointed Receiver of this New York road. It is 11 miles long.

Shreveport & Arkansas.—Tracklaying was completed south from Benton, Bossier County, La., to Shreveport, last week. The road starts from Lewisville, Ark., on the St. Louis, Arkansas & Texas, of which road it is an extension.

Southern Pacific.—A branch extending from Boulder Creek, Cal., up the San Lorenzo Canyon, a distance of seven miles, has been completed.

Tennessee & Coosa.—This Alabama road has just been reorganized, a majority of the stock having been purchased by New York capitalists and arrangements made for a prompt completion of the road. The grading on 36 miles of the road from Gadsden, on the Coosa River, to Guntersville (Wethy City), on the Tennessee River, was nearly completed before the war of the rebellion. Track has been laid, and the road is in operation from Gadsden to Littleton, 11 miles, crossing the Alabama Great Southern (C. N. O. & T. P.) at Attalla. The line has been extended and surveys made from Guntersville to Huntsville, the city of Huntsville having promptly raised over \$80,000 by subscription at a public meeting, April 5, to secure the location through that city. Proposals for completing the road, including an iron bridge over the Tennessee River near Guntersville, will be invited at once. Mr. E. A. Quintard, 69 Wall street, New York, is President, and William H. Case Chief Engineer, with office at Gadsden, Ala. The road traverses a rich agricultural, timber and mineral region, and connects at Gadsden with the Anniston & Cincinnati and the Rome & Decatur, and at Huntsville with the Memphis & Charleston and the Elara branch of the Louisville & Nashville.

Eighty thousand dollars has been subscribed to the road in Huntsville, Ala.

Tennessee Midland.—The track has been laid from Jackson, Tenn., southwest toward Memphis as far as Whiteville, 25 miles from Jackson.

Toledo, Ann Arbor & North Michigan.—The survey for the extension north from Cadillac, Mich. (the present northern terminus) to Frankfort, on Lake Michigan, a distance of 63 miles, is now being made.

Toledo, Saginaw & Mackinaw.—Bids are asked for tracklaying from Durand, Mich., north to East Saginaw, a distance of about 35 miles. Correspondence is invited also from rolling stock manufacturers. Address William Doheny, Superintendent Saginaw Construction Co., East Saginaw, Mich.

Turtle Mountain & Manitoba.—An application will be made to the legislative assembly of Manitoba for permission to construct a road from a point on the southern line of Manitoba, west of the Turtle Mountains, northwesterly through the municipality of Souris River, crossing the Souris River at Melita and then to Virden on the Canadian Pacific.

Union Elevated.—The branch of this road which starts from Adams and Myrtle avenues, Brooklyn, N. Y., has been completed and opened for traffic.

Waycross & Dublin.—The company has been chartered in Georgia to construct a road from Waycross to Dublin, a distance of 108 miles. It is thought to be in the interest of the Plant system. E. C. Machin and others, of Macon, are the incorporators.

Wheeling, Wellsburg & State Line.—The survey has been commenced, starting from Canonsburg, Pa., and will be continued via Bethany to Wellsville, W. Va.

Winona & Southwestern.—The company, which proposes to build a road between Winona, Minn., and Omaha, has negotiated with the Farmers' Loan & Trust Co. of New York, for \$8,000,000 first mortgage bonds. A traffic agreement has been signed with the Green Bay, Winona & St. Paul. Construction work will begin, it is said, when the location is completed.

TRAFFIC AND EARNINGS.

Traffic Notes.

The disagreements between the Michigan Central and the other lines between Chicago and Detroit have been temporarily adjusted, pending a settlement under the direction of Vice Chairman Daniels.

Lake and rail lines are making contracts for grain from Chicago to New York at 18 cents per 100 lbs. The Western Transit Company announces its tariff on merchandise westbound as follows (New York to Chicago): 35, 30, 25, 20, 18, 16. The ore traffic offering is so much lighter than last year that lake rates to and from Chicago and Milwaukee are likely to be lower than then.

The Georgia Railroad Commission has refused the request of the colored people that first and second class passenger rates be established, but holds that the railroads must furnish colored people accommodations in every way equal to those furnished the whites.

The Inter-state Commerce Commission has assigned for hearing in Washington, April 24, the complaint of J. H. Nicolai, of Baltimore, and John W. S. Brady et al., against the Pennsylvania railroad for discrimination in transportation of oil.

The Chicago roads now receive shipments of intoxicating liquors for transportation from points outside of the state of Iowa to points within that state, and vice versa, but will not receive such shipments originating at and destined to points within that state, unless there is delivered to the agent a certificate from the auditor of the county in which the point of destination is located showing that the consignee has authority to sell intoxicating liquors in such county.

Cotton.

The cotton movement for the week ending April 6 is reported as follows, in bales:

Interior markets:	1888.	1887.	Inc. or Dec.	P. c.
Receipts.....	10,842	18,292	I. 1,550	8.5
Shipments.....	33,043	29,240	I. 3,803	13.0
Stock.....	248,536	132,220	I. 117,316	88.9
Imports:				
Receipts.....	30,563	29,308	I. 10,255	35.0
Exports.....	67,983	40,964	I. 27,024	65.9
Stock.....	658,214	512,287	I. 145,957	28.5

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

Month of March:	1888.	1887.	Inc. or Dec.	P. c.
A'tantic & Pac...	213,075	235,653	I. 22,618	9.6
Buff., R. & Pitts.	158,613	160,688	I. 2,075	1.3
Cairo, V. & Chic.	54,462	63,543	I. 9,081	14.3
Canadian Pac...	946,000	719,000	I. 227,000	31.6
Chic. & Atlantic...	161,027	224,866	I. 63,838	28.4
Chi. & East. Ill...	169,108	163,013	I. 6,155	3.8
Chi. & Ind. Coal...	47,987	34,703	I. 13,284	38.3
Chi., Mu., & St. F...	1,931,000	2,212,689	I. 281,086	12.7
Den. & R. G...	569,500	586,400	I. 76,000	13.1
Kingston & Pem...	13,339	9,532	I. 3,807	40.1
Lake E. & W...	1,051	187,179	D. 36,508	10.7
Louisv. & Nash...	1,245,270	1,326,532	I. 81,002	6.1
Louis., N. A. & C...	157,034	191,301	I. 31,237	17.4
Mil., L. S. & W...	107,931	234,239	I. 66,295	28.3
Mil. & Northern...	29,241	39,492	D. 18,250	0.6
Mobile & Ohio...	20,297	180,466	I. 12,831	8.8
N. Y. C. & H. R...	2,849,000	2,919,810	I. 70,001	2.4
Norfolk & West...	302,409	296,619	I. 95,710	32.2
Northern Pacific...	1,187,745	1,030,679	I. 157,066	15.2
Ohio River...	25,227	19,083	I. 6,144	32.2
Ohio Southern...	54,461	51,450	I. 3,003	5.8
St. L. A. & T...	199,231	182,869	I. 16,381	9.0
St. P. & Duuth...	450,312	347,742	D. 97,400	17.8
St. P., M. & Man...	90,117	89,704	I. 354	1.1
Texas Pacific...	47,733	679,774	D. 52,500	8.4
Tol., A. A. & N. M...	49,537	49,531	I. 186	4.4
Tol. & O. Cent...	78,482	76,334	I. 2,148	2.8
Wabash...	431,960	644,328	D. 212,360	23.0
West. N. Y. & P...	226,100	217,900	I. 8,800	4.1
Wheeling & L. E...	74,685	61,278	I. 13,407	21.9
Total.....	\$13,479,123	\$13,967,505	D. \$1,471,076	7.9
			I. 623,204	...
Net.....			D. \$488,472	3.5

Month of February:

Bur., C. R. & Nor.	231,014	195,938	I. 25,076	12.8
Net.....	57,486	45,847	I. 11,630	25.4
California South...	172,775	116,234	I. 56,541	48.7
Net.....	75,316	54,381	I. 20,785	38.1
Carolina Central...	53,655	50,717	I. 2,938	5.8
Net.....	30,758	17,160	I. 13,598	70.0
C. O. & S. W...	155,762	124,803	I. 30,938	24.8
Net.....	49,262	42,860	I. 6,393	14.9
Chi., Bur. & Q...	1,686,519	1,847,234	D. 160,715	8.7
Net.....	488,247	802,390	D. 374,143	43.4
C. I., St. L. & C...	202,273	196,071	I. 5,602	2.9
Net.....	70,551	75,553	D. 5,002	0.6
Louis. & Nash...	1,280,395	1,170,016	I. 110,379	9.4
Net.....	400,988	423,606	D. 22,618	5.3
Minn. & St. L...	109,234	103,366	I. 5,908	5.7
Net.....	25,557	13,443	I. 12,114	90.4
New Brunswick...	54,799	47,761	I. 7,038	14.7
Net.....	9,740	2,472	I. 7,208	29.3
Phila. & Erie...	272,052	257,300	I. 14,552	5.6
Net.....	109,510	100,235	I. 9,275	9.3
Sea. & Roanoke...</td				